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The problem of Pap Smear patient reporting times has plagued the 67th Combat Support Hospital and Europe for three years. The laboratories that have supported this organization have at time been unable to comply with regulatory requirements or performance standards. The Department of Defense standard of performance in the area of Pap Smear patient reporting times is thirty days. The inability to maintain adequate support has resulted in PapSmear patient reporting times being as great as eighty-nine days, fifty-nine days greater than the standard adopted by the Department of Defense. In conjunction with the actions of a process action team to investigate the problem of excessive Pap Smear turnaround times the conclusion that Pap Smears should be conducted in house has resulted. This study shows that hiring in house cytotechnologists not only significantly reduces patient reporting time and enhances quality, but is also cost effective.

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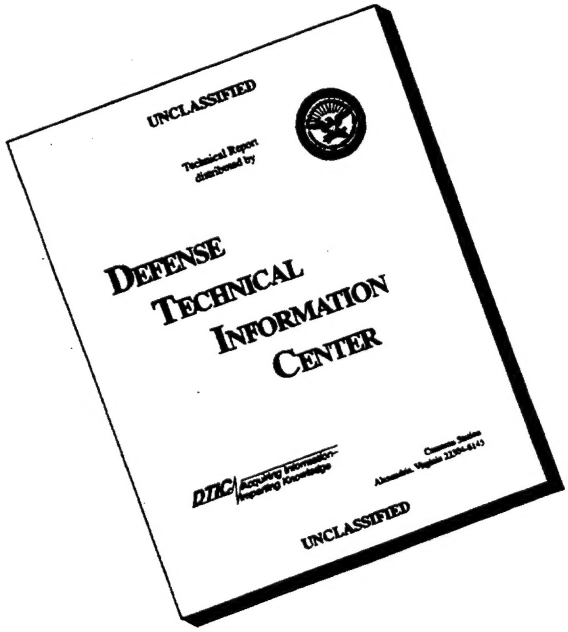

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U.S. Army-Baylor University Graduate Program

in Health Care Administration

Graduate Management Project

Determination of the Best Method of Reducing Papanicolaou Smear Patient Reporting Times at the 67th Combat Support Hospital, Wuerzburg Germany

Presented to

the Faculty of

Baylor University

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the requirements of the

Degree of

Masters in Health Care Administration

by

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Wuerzburg, Germany

17 November 1995

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ABSTRACT

Determination of the Best Method of Reducing Papanicolaou Smear Patient Reporting Times at the 67th Combat Support Hospital, Wuerzburg Germany

The problem of Pap Smear patient reporting times has plagued the 67th Combat Support Hospital and Europe for three years. The laboratories responsible for supporting this organization have at times been unable to comply with regulatory requirements or performance standards. The Department of Defense standard of performance in the area of Pap Smear patient reporting time is thirty days. The inability to maintain adequate support has resulted in Pap Smear patient reporting times greater than one hundred days, seventy days greater than the standard adopted by the Department of Defense. This study, completed with the input of a process action team designed to investigate the Pap Smear reporting times, concludes that Pap Smears should be completed in-house. This study shows that hiring in-house cytotechnologists not only significantly reduces patient reporting time and enhances quality but, is also cost effective.

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CHAPTER 1

INTRODUCTION

The 67th Combat Support Hospital (CSH) has a long history of service to the nation. The 67th CSH began its existence as Evacuation Hospital (EVAC) No. 67 and was originally organized on 21 July 1924 in the Army Reserves. During World War II, the hospital landed on Utah beach in November 1944. During the war years of 1944-1945 the hospital served in both France and Germany and received an Army Meritorious Unit Commendation. During the Vietnam conflict the 67th EVAC participated in fifteen campaigns and was awarded two Army Meritorious Unit Commendations. After the Vietnam conflict the hospital was moved to Germany.

After one move in Germany the 67th EVAC settled in Wuerzburg which brings us to the present. The 67th Evacuation Hospital was redesignated on 16 July 1993 as the 67th Combat Support Hospital. With this redesignation the 67th CSH continued its readiness and combat service support mission and assumed the peacetime mission of supporting a patient population of over 80,000 eligible Department of Defense (DoD) beneficiaries. To accomplish its peacetime mission the 67th CSH has gained oversight responsibility of twelve outlying health clinics. The distances to the outlying health clinics range from ten to one hundred and ninety-nine miles.

This brief history outlines some of the changes the 67th CSH has experienced from its creation through the recent drawdown in Europe. The issue of Papanicolaou (Pap) Smears is one aspect of the drawdown worth attention. The drawdown has resulted in a realignment of personnel and leaves the 67th CSH without adequate resources to perform Pap Smears within house.

Conditions which Prompted the Study

Actually the inability of Medical Treatment Facilities (MTF), in Europe, to adequately report Pap Smear results to the patient has existed for many years. An audit conducted by the 7th Medical Command (7th MEDCOM) linked this problem to three main areas. There existed a chronic shortage of cytotechnologists, a lack of guidance from the higher headquarters, and lengthy administrative delays in the processing of Pap Smears. The latter, was linked to the lack of data being collected in the processing of Pap Smears (7th Medical Command 1993, 12).

The audit referred to the different hospitals using different approaches to receive their Pap Smear results. Frankfurt Medical Activity (MEDDAC) and the Wuerzburg MEDDAC used Brooke Army Medical Center (BAMC) and a commercial lab for cytology support. They did not utilize the 10th Medical Laboratory (MEDLAB). 10th MEDLAB was the precursor to the Landstuhl Regional Medical Center (LRMC) laboratory assuming responsibility of performing laboratory services. Nuernberg for a period of time also used BAMC for cytology support (7th Medical Command 1993, 12).

The 67th Combat Support Hospital has been in a state of flux due to the drawdown of forces and subsequent realignment of supporting units. Since the drawdown and before 23 August 1994, all Pap Smears were tested at LRMC. However, due to personnel problems at LRMC, they were unable to continue to perform Pap Smear testing. Beginning 24 August 1994, the 67th CSH was without a Pap Smear testing capability for over two months. This was the second time in two years that a situation at Landstuhl had affected Pap Smear patient reporting times at the 67th CSH. This reflected an earlier situation when, in May of 1993, similar circumstances also resulted in an interruption of Pap Smear testing performed by LRMC (7th Medical Command 1993, 12).

Seeking a solution to the problem of excessive patient reporting times the 67th CSH tried German laboratories. In August of 1994, the 67th CSH contracted with a German laboratory to perform Pap Smear testing. The contract with Kapp & Breuer was awarded in late August. The contract ended early as Kapp & Breuer's performance was deemed to be sub-optimal.

Sub-optimal performance was recorded in the area of slide screening and reporting the results. Slides were observed to be read improperly and the laboratory did not consistently use the standard Bethesda Cytological Classification System terminology. The poor quality of results forced the Pathologist at the 67th CSH to perform quality assurance audits of the work performed by Kapp & Breuer. The audit consisted of a 10 percent rescreen of all "normal" results and a 100 percent review of all

abnormal smear results. This internal audit improved result quality to the patient but increased the Pap Smear patient reporting times.

The cost per slide tested by Kapp & Breuer was 13 Deutche Marks (DM). This price included pick-up of Pap Smears and delivery of results. Kapp & Breuer is certified by the College of American Pathologists.

LRMC resumed Pap smear support of the 67th CSH on 1 November 1994. LRMC would not, however, accept our backlog. During this period over 1000 Pap Smears accumulated. This required a second contract to be awarded with another German laboratory, Bioscentia. Bioscentia is located near Frankfurt. This contract became effective on 17 November 1994. On this date the first batch of Pap Smears was sent to Bioscientia for testing.

The cost per slide charged by Bioscentia was DM15. This price also included courier service. Bioscentia was not certified by the College of American Pathologists (CAP) for cytology procedures.

The backlogged slides were sent to Bioscientia in batches. The final results of the backlogged slides were received by the 67th CSH on 19 January 1995. This resulted in a laboratory turn-around time equaling up to eighty-nine days from the start of the difficulties until their completion. The current standard required by the Department of Defense in Europe is thirty days (7th Medical Command 1993, 9). This eighty-nine day turn-around time is exclusive of the time remaining to report results to the patient.

These problems with excessive Pap Smear reporting times led the 67th CSH to consider a review of the situation. Over the past six months Pap Smears have been sent to three different places with varying degrees of success. However, the affect on the patient reporting times have been dismal. Additionally, the problems illustrated here have led to numerous complaints from the supported population and has resulted in a potential risk management issue. There exists the possibility of a potentially hazardous situation occurring as the result of a delayed diagnosis of questionable cytologies. The excessive patient notification time is at the heart of this potential health risk.

The 67th CSH's command projects that with the expected turnover LRMC will face during the summer of 1995, that this problem may again surface. Currently, the cytology laboratory at LRMC is down to four cytotechnologists (Martig 1995). This represents 50 percent of assigned strength. If personnel problems are not encountered over the summer, improvement is still required in the Pap Smear patient reporting times.

LRMC personnel state that the current laboratory turn-around time is seven days for active duty and fourteen days for other than active duty. These times quoted are testing times only and do not include inprocessing, or Composite Health Care System (CHCS) recording times. The 67th CSH calculated the total laboratory turn-around time at LRMC for Pap Smears sent in February was 29.8 days, barely within the DoD standard. This figure is the time required from the shipment date from the 67th CSH to certification of the results by the LRMC laboratory. This time was determined by taking

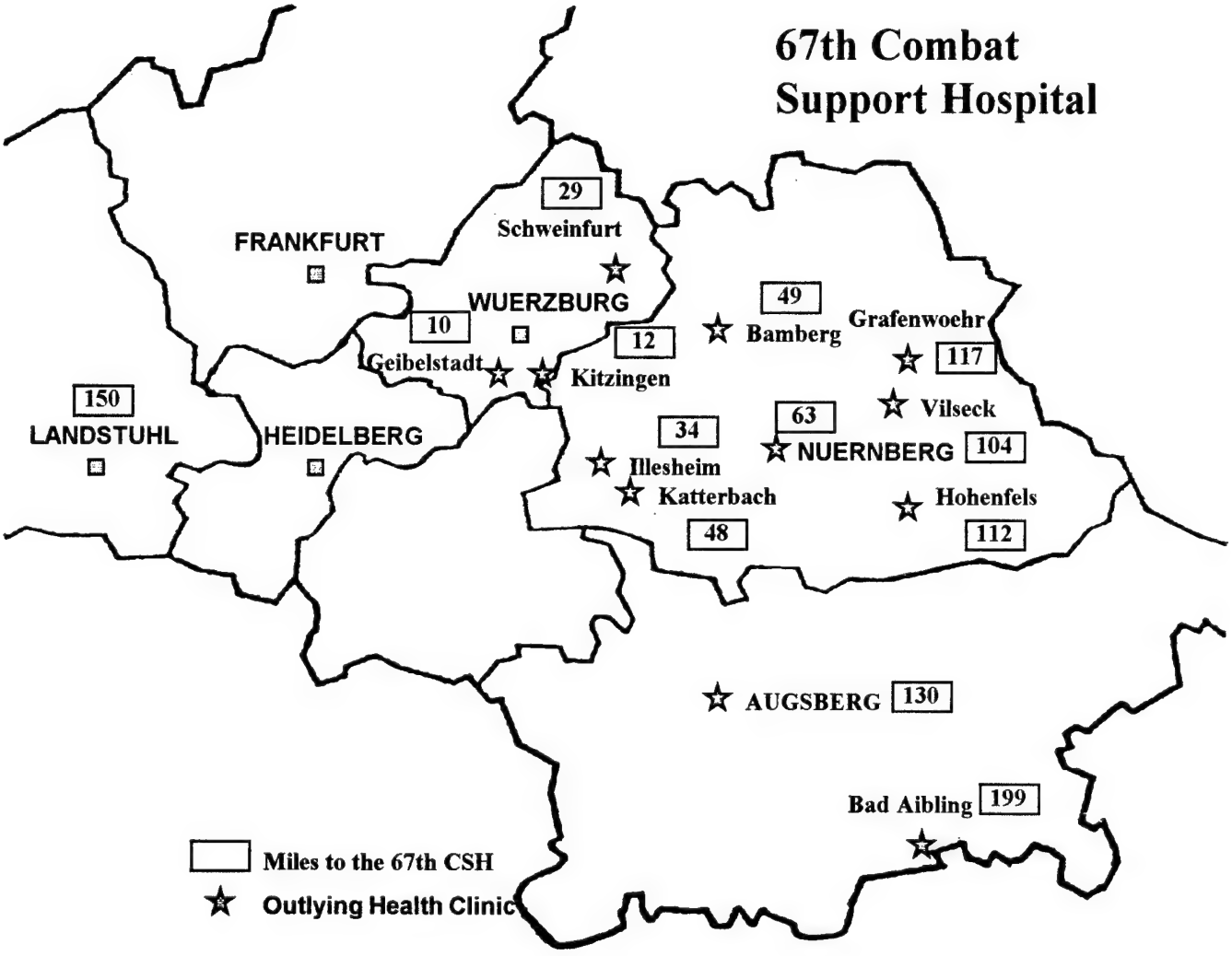
a random sample of all Pap Smears accepted by the 67th CSH's laboratory in February. A 5 percent sample was obtained and the turn-around time calculated. This time includes shipping time to LRMC but is exclusive of some administrative requirements and the time required to notify the test results to the patient. A summary of this data is attached in Appendix 1.

To illustrate the difficulties encountered in the 67th CSH area of responsibility a map of Germany is shown in Figure 1 to give perspective to our area and to the distances involved. The inconveniences of distances required to service the outlying health clinics further increases the patient reporting times. Figure 2 shows the distances to Landstuhl and the outlying health clinics relative to the 67th CSH.

Figure 1: Map of Germany

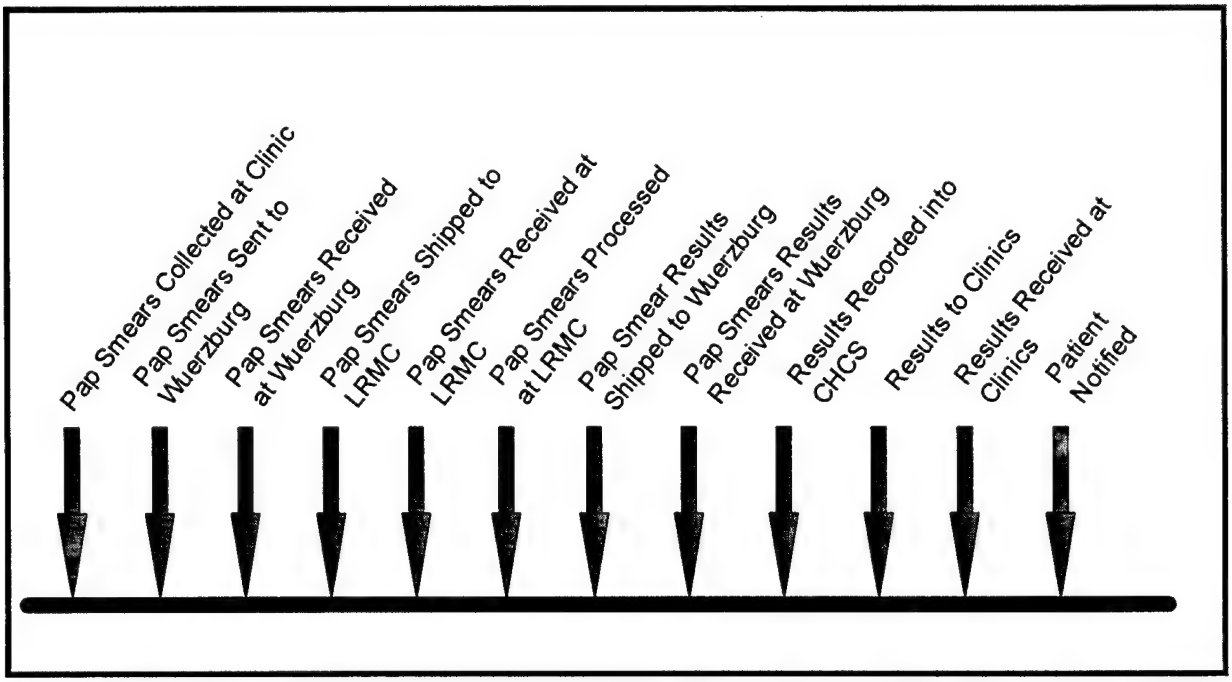
The Software Toolworks World Atlas, 1993

Figure 2: Map of 67th CSH's Area of Responsibility



The Pap Smear process follows a number of different steps. Typically the Pap Smears sent to LRMC followed a process illustrated by the timeline shown in the Figure 3.

Figure 3: Initial Pap Smear Timeline, January 1995



Statement of the Problem

The purpose of this study is to determine the best method of processing Pap Smears as to minimize the time in days required to report quality results to the patients of the 67th CSH.

Literature Review

The literature review required for this study researches three main areas: the background of the Pap Smears, the legal and regulatory requirements concerning Pap Smears and laboratory management, and the Total Quality Management (TQM) initiatives previously undertaken to improve laboratory functions.

Pap Smears screen to detect the precancerous changes that could develop into cervical cancer. Cancer of the uterine cervix has been significantly reduced in the United States due to adequate prevention measures such as the Pap Smear (Koss 1992, 371). The Pap Smear was developed by Doctor George Nicholaus Papanicolaou in the 1930s. It was in preparation of The Sexual Cycle in the Human Female as Revealed by Vaginal Smear that Papanicolaou first recognized cancer cells of the cervix. In the 1940s the examination of cervical cells became accepted as a diagnostic tool. Subsequent publications recognized cytology as a valid diagnostic tool (Jorgensen 1984, 881).

Various methods have been used throughout the years to determine which method is best to predict cervical abnormalities. While the microscopic examination of cells or a Pap Smear has been reliable in obtaining an adequate diagnosis, it is limited (Koss 1992, 372). As such it has been determined that the Pap Smear alone is not indicative of cervical cancer. As a result, the Pap Smear is used as a screening device.

When the result of the cervical smear is positive the Pap Smear is followed up by a biopsy (Collins and Newton 1989, 216). When an abnormality does appear a definitive test such as a colposcopy has been indicated by the literature as the current standard of practice (Lucci and Berman 1992, 92; Killackey, Rodney and Sheets 1988, 239). Koss states that the colposcopy must take place on the basis of the first abnormal smear. This is due to the high failure rate of "confirmatory" smears. Confirmatory smears are smears done to confirm the findings of the preceding Pap Smear. Studies have shown that up to 40 percent of patients with confirmed carcinomas can have repeat smears that are in error and present with an absence of cancerous cells (Koss 1992, 476).

The Department of Defense has adopted a policy that states that the results of Pap Smears should be reported to the patient within thirty days in overseas locations (7th Medical Command 1993, 9). This standard has been adopted in conjunction with the Clinical Laboratory Improvement Program (DoD CLIP). DoD CLIP is the Department of Defense's response to the Congressional approval of the Clinical Laboratory Improvement Amendments of 1988 (CLIA). (Armed Forces Institute of Pathology 1994, 2). The CLIP was made policy on 8 October 1993 by the Assistant Secretary of Defense for Health Affairs and endorsed by the Army Surgeon General on 29 November 1993 (Martin, Edward D. 1993, 1 and Lanoue, Alcide M. 1993, 1).

The CLIA were enacted to set rules to improve laboratory standards. Specifically in the area of cytology, the intent was to specify descriptive standards by which

cytopathological testing would occur. CLIA as it related to cytopathology was concerned with three major areas. These areas include: workload restrictions and quality control; personnel requirements; and proficiency testing (Bachner and Hamlin 1993, 989-91).

The area of quality control and workload prescribed that individuals screening cytology specimens may not exceed 100 slides within any 24-hour period. The quality control requirements include:

1. Review of previous negatives results against current negative results.
2. Historical comparisons of results.
3. 10 percent random sampling review.
4. Annual review of laboratory results compared against the individual cytologist results.
5. Identification and recording of unsatisfactory specimens.
6. The use of narrative and descriptive terminology.
7. An error detection system (Bachner and Hamlin 1993, 990).

The proficiency testing requirements required all individuals engaged in examining gynecological cytology to be enrolled in an approved proficiency testing program. The proficiency testing program requires annual testing. The testing entails a prescribed regime of slide identification. A pass rate of 90 percent is required for successful completion (Bachner and Hamlin 1993, 991).

The 7th Medical Command published 7th MEDCOM Regulation No. 40-40 on 28 January 1993. The regulation titled Patient Notification of Pap Smear Results was intended to provide specific guidelines controlling Pap Smear processing and ensure compliance with DoD reporting requirements. The regulation outlines uniform

notification requirements and specific certified mail notification requirements of Class III cytologies (7th Medical Command Regulation 1993, 2). Class III cytologies indicate the identification of cells that are suspicious for premalignant or malignant endocervical cells (Lucci and Berman 1992, 87).

The use of the term Class III cytologies is now considered outdated. Current terminology equates Class II and III cytologies to a newer term, high-grade squamous intraepithelial lesion (HSIL). This terminology is consistent with the Bethesda Cytologic Classification System for classifying endocervical tissue samples (Lucci and Berman 1992, 88). The Bethesda system is the universally accepted method to improve consistency in reporting Pap Smear results. The importance of a universal reporting method is essential in dealing with other laboratories whether military, civilian or German.

There have been many moves toward total quality management to improve the quality in the clinical laboratories. As early as 1967, Dr. Myron Melamed called for quality control in clinical laboratories. To maintain high standards Dr. Melamed called for establishing general guidelines or minimum requirements for laboratories and personnel. Additionally, he proposed that a variety of tools be developed to allow laboratories to evaluate diagnostic accuracy (Melamed 1967, 203).

Dr. Melamed considered evaluating laboratory standards in five categories. He suggested that all five are essential to acceptable laboratory performance and include:

personnel, Dr. Melamed called for education standards and continued education; specific physical standards for the facility are required for test accuracy and employee protection; consistency in specimen collection; requirements for records and reporting to monitor quality assurance; and the accuracy of screening and consistent interpretation of results (Melamed 1967, 203-04).

Besides these trend setting Quality Assurance (QA) concepts set for the cytological community of the 1960s, Dr. Melamed has a suggestion for the 1990s. In a reevaluation of his earlier position on QA he speaks of computer technology. In 1992 he stated, "Quality assurance in cytology must be based on a correlation with histology and the clinical course. That is now feasible on a continuing basis with presently available computer systems" (Melamed 1993, 461).

Indeed Dr. Melamed has foreseen the future not only in quality control, but also in an automated system that can detect cancer cells. The PAPNET system is a combination of microscope, machine and computer that uses a neural network. The system has been shown to be an excellent tool for ensuring accuracy in the cytology laboratory. An example of its proficiency was shown when PAPNET detected abnormal cells when only five existed on an entire slide (Boon and Kok 1993, 411).

Dr. Melamed was a pioneer in the quality assurance movement in the cytologic laboratory. However in recent years the movement appears to be towards Total Quality Management (TQM) as well as QA. TQM or Continuous Quality Improvement (CQI)

was first introduced by Shewart in the 1920s (Shewart 1925, 546) and has gained popularity by the work of Deming and the affect it had on the quality of Japanese products (Deming 1986, 486-92).

The overall changing in the theme of Quality Assurance to Quality Improvement is evident to anyone following the changes made in past decades by the Joint Commission on Accreditation of Healthcare Organizations (JCAHO). The trend has been an evolution of approaches in defining, measuring and improving the quality of care. With the recent Agenda for Change the Commission has thrust the stimulus for accreditation on CQI. JCAHO sees CQI as the future of healthcare (JCAHO 1991, 7-9).

The JCAHO recommends a team approach to CQI. They point to the work at Halstead Hospital of Halstead, Kansas. They developed an Accreditation Compliance Team (ACT). They credit the ACT for creating innovative ways of achieving and maintaining compliance with JCAHO standards (JCAHO 1994, 4).

The Parkview Episcopal hospital in Pueblo, Colorado used a team approach to reduce the delays of the day's first scheduled surgery. Through analysis of the problem the nine member team reduced the number of late surgeries from 48 percent to 8 percent (JCAHO 1992, 12-13).

The cytological laboratory is one area that lends itself to CQI. The Pap Smear itself has been a subject of much interest. In 1988, JCAHO qualified the Pap Smear as a high-volume, high-risk, and problem prone aspect of patient care (JCAHO 1988, 24). A

number of different studies in recent years have shown the value added of the CQI process as it pertains to the Pap Smear.

In a study to improve the Pap Smear process at Henry Ford Hospital a team approach was said to have led to a "far better understanding of the process." The study was designed to reduce the numbers of "inadequate" or "less than optimal" slide presentations. The team reported that the team process itself was a significant tool in helping to learn CQI techniques. In this study, CQI techniques were used to determine the best method of procuring cervical cells for slide preparation (Burkman and others 1994, 471-74).

In another study undertaken by the H. Claude Hudson Comprehensive Health Center (CHC) of Los Angeles, a CQI approach concentrating on monitoring was applied. The study was designed to reduce the numbers of unacceptably high nonrepresentative Pap Smears. Nonrepresentative Pap Smears are those which cannot be read due to poor specimen harvesting technique. This problem caused a number of problems for CHC, including large numbers of retests and increased appointment backlog (Pachciarz and others 1992, 229).

The study's recommendations resulted in a reduction in the rate of nonrepresentative Pap Smears from 16 to 4.06 percent. The study team credits CQI philosophies and sampling tools. (Pachciarz and others 1992, 232). The results had a

significant impact on nonrepresentative rates but also on clinical care and patient follow-up. Next the researchers in this study expect to monitor the rate of unsatisfactory specimens to reduce the numbers of false-negative results (Pachciarz and others 1992, 234).

Due to the perceived advantages of the use of Process Action Teams (PAT) to offer extraordinary solutions to complex problems the 67th CSH's Quality Improvement Committee formed a PAT to solve the Pap Smear patient reporting problem. The team is tasked to reduce the inordinate length of time required to report Pap Smear results to patients. This is a short term goal.

A direction as to where to begin evaluation of this problem is reflected in a study of turnaround times within an English hospital. Undertaken in Glasgow, this study found that a major cause for increased turnaround times was due to post analytical period, the period of time following testing. Hospital wards received their results within 24 hours. Outlying facilities however did not receive results, in some cases, for five days (Smellie, Johnston, and Galloway 1994, 587). This suggests that getting the reports back to the outlying clinics of the 67th CSH may be of concern.

Purpose (Variables/Working Hypothesis)

As noted earlier, the purpose of this study is to determine the best method of processing Pap Smears to minumize the time in days to report quality results to the

patients of the 67th CSH. Patient reporting time is the total time required from specimen collection to patient notification.

When evaluating which method is the best way to reduce the reporting time of results to patients, a number of criteria need to be evaluated. The criteria that this study is concerned with include quality, reporting time, cost, and reliability.

The five hypotheses tested relating to quality, reporting time, cost and reliability form the alternatives offered as a solution to the problem of lengthy reporting times. The primary hypothesis is based on the assumption that without change the process will not improve.

Primary hypothesis: Do something to the current Pap Smear processing to improve the patient reporting times.

The secondary hypotheses form the alternate solutions to the problem of lengthy reporting times. The four secondary hypotheses are:

1. Apply CQI principles to the Pap Smear process in order to improve the process without drastic changes to the overall process.
2. Consider new contracts with German laboratories.
3. Consider contracting with laboratories located in the United States.
4. Perform Pap Smears in-house.

The null hypotheses of each option, primary and secondary, suggest that the hypotheses will not offer a solution to reducing patient reporting times.

CHAPTER 2

METHOD AND PROCEDURES

This study will employ a case study methodology, using a holistic single-case study design. Specifically, the holistic case study for a revelatory case is appropriate here as this situation has not been previously studied in-depth (Yin 1994, 40). Yin states that case studies are an appropriate method of study and "have a distinctive place in evaluation research" (Yin 1994, 15).

Yin outlines four study designs he considers practical for research. On a 2 X 2 matrix he illustrates the various types (Yin 1994, 39). The matrix is shown in Figure 4.

Figure 4: Case Study Matrix

	Single-case Design	Multiple-case Design
Holistic	Type 1	Type 3
Embedded	Type 2	Type 4

The single-case and multiple-case design refer to the whether the studies can be compared. In a multiple-case study the experiment may occur over different periods of time or vary by location. A single-case study is considered useful for rare cases while the multiple-case study would be for reoccurring events. The single-case study represents a snapshot look at a specific experiment. Holistic and embedded studies vary in regards to

scope of the experiment. The holistic study refers to a study that involves one unit of analysis. The embedded design involves the study of the related sub-units. According to Yin, both the multiple and embedded designs require extensive design requirements (Yin 1994, 38-44).

This study is a type 1 study investigating one global concern--Pap Smear patient reporting times. This is in contrast a study concerning laboratory tests in general that may be considered a type 2 study. This type of study would require analysis of different laboratory tests and their related procedures. A type 3 study would occur as a follow-on to this study and drawing comparisons between the studies. The type 4 study would not only consider different laboratory tests but may also require comparisons over separate periods of time or different laboratories (Yin 1994, 38-44).

The holistic single-case study design best fits this case study due to the fact that this is a rare case or phenomenon, specific to this setting, which has not been studied before. The vary nature of the 67th CSH, containing twelve outlying health clinics and two internal clinics that all contribute significant numbers of Pap Smears, is unique. In this case, it is appropriate to evaluate the different ways of completing Pap Smear testing.

This study will employ a methodology that evaluates the different study hypotheses with respect to one another and will conclude with a determination of an optimal solution. Four different evaluation criteria have been developed to judge each alternative. A weight will be assigned each evaluation criterion. The higher the weight the more important the evaluation criterion. Each different alternative will be assessed as

better or worse than the other alternatives. This will result in the assignment of a relative value. The assessment and assignment of relative values will be explained in more detail; however, lower numbers imply a better result. A decision matrix will be constructed that links the weighted evaluation criteria and the relative values for each alternative. The result will then be calculated. The alternative resulting in the lowest number will suggest which option is the best option. As noted earlier, the decision matrix and its components will be explained in greater detail.

As stated earlier there are four evaluation criterion. Each evaluation criterion judges the different hypotheses in a specific area. The four evaluation criteria are: quality, patient reporting time, cost, and reliability.

Quality is the first evaluation criteria. Quality of the results is the most important evaluation criterion. For the purpose of this study, quality is defined as the accuracy of the clinical diagnosis. Quality can be measured many ways. Quality for this study will be measured by the clinical laboratory's adherence to the CLIA and CLIP guidelines. Workload restrictions, quality control and proficiency testing are examples of the requirements of CLIA and CLIP (Bachner and Hamlin 1993, 989-91). We will assume quality in the alternative hypotheses that have laboratories that are College of American Pathologists (CAP) certified.

In laboratories that are not accredited, another method to ensure quality is required. Laboratories that are not CAP certified will be evaluated by determining the level of adherence with the different factors considered for CAP certification.

Factors which are considered in the certification of CAP laboratories include: the review of previous negative results against current negative results; historical comparisons of results over time; a 10 percent random sampling review or rescreen performed to ensure technician accuracy; an annual review of laboratory results compared against the individual cytologist results to determine individual technician proficiency; predetermined identification and recording procedures for tracking of unsatisfactory specimens; the use of narrative and descriptive terminology in reporting practices; and an error detection system (Bachner and Hamlin 1993, 990). A determination of a laboratory's adherence to the CAP consideration factors will be performed by a telephone survey directed towards attaining the laboratory's level of compliance with the stated CAP requirements.

A laboratory that is CAP certified will receive a relative value of one, the best possible value for quality. A discussion of relative values follows later in this section. Remaining non-certified laboratory options will receive a relative value based on the laboratory's adherence with the CAP certification consideration factors. The higher the number of consideration factors adhered to will result in a lower or better relative value. For example, consider three laboratories with the following characteristics: one laboratory CAP certified, one laboratory adhering to three certification consideration

factors and a third laboratory adhering to six certification factors. The laboratory and corresponding hypothesis will receive the following relative value scores: CAP laboratory--1; the six factor laboratory--2; and the three factor laboratory--3.

Patient reporting time is the second evaluation criteria. The concern with measuring patient reporting times is consistency of measurement. Laboratory turnaround times can be measured in minutes, hours or days. Many studies have measured turnaround times in minutes. In a study that used computers to improve stat laboratory test turnaround times, minutes were used due to the immediacy of time (Rollo and Fauser 1993, 901-02). The turnaround time study in the English hospital mentioned earlier considered hours to be the appropriate time frame for evaluating routine laboratory testing times (Smellie, Johnston, and Galloway 1994, 587).

This study will describe reporting time in days. Days as a reporting method has been used in a number of studies including the Pap Smear processing audit conducted by the 7th Medical Command. Due to the reduced expediency required by Pap Smears it is considered common practice to report Pap Smear reporting times in days. Reporting in days appears as the appropriate measure as the standard set by DOD is also in days (7th Medical Command 1993, 12).

Patient reporting time is a function of a number of different variables that include initial processing time, shipping time, processing time at the laboratory, time required to perform the actual test, time required, if needed, to assure quality, time to document results and time required to report results to the patient. Each of the different alternative

hypotheses will be evaluated for total time required to report the results to the patient. In Pap Smear patient reporting times the significant events are the start point and the end point. The start point is when the sample is obtained from the patient. For our purposes the ending point is when the Pap Smear result is mailed to the patient or the patient is notified by telephone of a Class III or HSIL finding. The steps in-between are appropriate only to the management process and will be evaluated to determine how they contribute to the overall patient reporting time.

To further evaluate the time involved in the various steps a new Pap Smear clinic tracking form has been developed to better determine the length of time between steps. The tracking form is located in Appendix 2. The amount of time the specimen is held at the clinic before sending to the laboratory, the time held at the laboratory prior to shipping, and the total processing time required prior to receipt of the results are of particular concern. With the laboratory stamping the date received on each sample the following times can be recorded: specimen collection to lab turn-in; lab turn-in to shipping; shipping date to results received on CHCS. These steps indicate the significant management areas of concern.

To determine the remaining time required to report the results to the patient a sample mailing will be completed. This will be conducted by mailing ten notification folders to individuals who work at the hospital. Two additional mailings will be conducted from two outlying health clinics. The date received will be recorded and submitted to the researcher. The researcher will record the average time taken at each

location. The intent is to determine the average number of days required for the laboratory to notify the patient by mail. A sample mailing envelope is located in Appendix 3.

The last consideration is the time required for a quality assurance check for non-certified CAP laboratories. This step requires a ten percent rescreen of all negative results and a 100 percent rescreen of all positive results. The time will be estimated by the pathologist of the 67th CSH who will be required to perform this function.

The determination of an accurate patient reporting time is also necessary to create and maintain a continual tracking mechanism. This step is essential to this study in determining the new patient reporting time after improvements. This determination of the patient reporting time improvement, if any, made by the Pap Smear PAT will then be used in comparison with other alternatives. To determine the length of time at each step illustrated above, a number of random samplings will be taken. These random samplings will consist of a month's worth of Pap Smears. Each random sampling will consist of a 10 percent sampling of all Pap Smears available for that specific month. Times will be recorded and descriptive statistics reported on the data obtained. The results of this sample will be compared to the previous sample to determine the effectiveness of the Pap Smear PAT.

This study requires some estimates of turnaround times for a number of the alternatives. Turnaround time of Pap Smears sent to the United States for testing will be determined from other facilities sending Pap Smears to that laboratory. The use of a

German lab will require a determination of the turnaround time experienced in the past when the 67th CSH used those laboratories. The alternative that results in the lowest patient reporting time will receive a relative value of 1. The next lowest will receive a value of 2, and so on.

Cost is the third evaluation criteria. Cost to the hospital is a major concern within the command. The costs will be measured in terms of comparing the costs required to deliver the Pap Smear service on a continuing basis to the facility. The time frame of one calendar year will serve as the period of comparison. Additionally, the costs will be based, when necessary, on the number of Pap Smears that the hospital would be required to perform in one year. For the purpose of this study that number is 13,000 Pap Smears, and is that which would be expected at the 67th CSH for one year. For the purpose of this study some costs will not require evaluation as they remain constant for each alternative. Examples of these costs are; shipping costs from outlying health clinic to the 67th CSH, clinic personnel costs associated with Pap Smear processing, and other clinic associated costs.

The cost to continue delivering the Pap Smear service consists of current and expected costs. Current costs include United Parcel Service (UPS) charges to deliver Pap Smears to LRMC. Expected costs would be the fees charges by United States or German laboratories as testing fees. The cost of the services will include both actual and unforeseen costs. Examples of actual costs are labor, equipment, supplies, and transportation charges. Examples of unforeseen costs include treatment of cancer lesions

diagnosed later than expected. This higher acuity results in costlier patient care procedures being required. Other unforeseen costs would be those associated with malpractice costs.

Each individual hypothesis or alternative contains different costs. The cost to continue with LRMC has different costs than the other alternatives. Costs to be concerned with in this alternative are the actual costs to ship samples to LRMC and the cost as estimated by Medical Expense and Performance Report System (MEPRS) to perform the tests. The shipping costs are determined through actual billings received from UPS. The MEPRS cost per individual Pap Smear is determined through the formula that is shown below:

Pap Smear Raw Procedure Count X Number of Weighted Procedures per Pap Smear
X Cost per Weighted Procedure = Cost per Procedure (Pap Smear)

The total cost of performing all Pap Smear testing is shown in the formula below:

$$\frac{\text{Total Raw Procedure Count} \times \text{Total Number of Weighted Procedures} \times \text{Cost per Weighted Procedure}}{\text{Total Number of Pap Smears}} = \text{Total Cost}$$

The value of the cost per procedure is an estimate of the cost required to do Anatomical Pathology (AP) tests at LRMC and is the nature of MEPRS. A Pap Smear is one of the most expensive AP tests.

MEPRS data is considered an estimate for a number of reasons. One of the biggest concerns with MEPRS is data accuracy. Accurate MEPRS data requires both accurate workload reporting and manpower documentation. At present, these sources can

be considered questionable due to faulty reporting and an inability to capture all the data. In this case, it could be an inability to capture hours or procedures. Additionally, the MEPRS cost data can also be considered questionable. To report accurate costs requires strict accounting procedures that Army hospitals are refining, but have not yet perfected. To be completely accurate would require the ability to track all costs and assign them to specific procedures.

The total cost to perform the 67th CSH's Pap Smears represents a significant amount of money. Theoretically, this money should belong to the 67th CSH if LRMC no longer performs our Pap Smear testing. Shifting of any funds would require extensive negotiation and this issue falls outside the scope of this paper.

The cost of having the testing completed in the United States is a combination of testing costs and shipping costs. The testing cost at this point has been estimated to be around $6.25 per single slide test. Shipping costs through UPS were determined to be approximately DM154 for a two kilogram box.

The cost of having the testing done by a German laboratory is similar to those incurred above, testing and shipping. The cost of testing is estimated at between DM13 and DM15. Shipping may be less of an issue if courier pick up is part of the contract. A conversion to American dollars will be required for adequate comparison. The figure used will be 1 U.S. dollar equal to DM1.72. This is a fixed rate set yearly in the Status of Forces Agreement between the United States of America and the German government.

The cost of performing Pap Smears in house contains many different costs. Those which need to be determined include salaries of new cytotechnologists, new equipment costs, the cost of supplies, and the estimated overhead costs gained through MEPRS.

As stated earlier, the costs will be projected on actual or estimated costs to deliver the service for an entire fiscal year. All costs will converted into annual costs. This includes UPS charges for a year, the cost of new equipment, and salaries. New equipment cost will be determined based on expected lifespan of the equipment. The cost for one year will be the total cost divided by the years of expected service.

The alternative that is the least expensive will be deemed the better alternative with respect to cost. If shipping the Pap Smears to the United States is the least expensive alternative it will receive a score of 1. Costlier alternatives will receive higher numbers.

Reliability is the fourth evaluation criteria. The reliability of continued services is the last factor this study will consider. This factor is arguably the most difficult to measure. For the purpose of this study, it will be measured as the percentage of results in which the patient reporting time meets the thirty day requirement. This number can be determined easily for the Pap Smears being sent to LRMC. However, the remaining alternatives must be determined by past experience. The German laboratories require a review of past history of turnaround times. The alternative utilizing the laboratory in the United States will require an estimation of reliability based upon expected turnaround times. In house estimates will be based on the current laboratory turnaround time for AP

tests. In a manner consistent with the other evaluation criteria the best alternative, highest reliability, will receive a score of 1.

These four criteria make the backbone of the important aspects of reducing the Pap Smear turnaround time. They represent the input the researcher has received for the command, physicians and the Pap Smear PAT.

Each of these evaluation criteria will be weighed by the researcher in order of importance. The Military Applications Program Package (MAPP) will be used to assign weights to the different criteria and develop a decision matrix. The MAPP contains a number of programs useful in solving problems. Examples of programs included in the MAPP are linear programming, regression analysis and statistical computations. The one beneficial here is the decision matrix program. This decision matrix program facilitates weighing of one evaluation criterion against each other.

Weights will be assigned to each evaluation criterion. The weight is based on the evaluation criterion's level of significance in reference to its favorability or unfavorability to the other criterion. A more important evaluation criterion will be weighted higher.

How strongly an evaluation criterion is favored over another is also recorded; either equally favored, slightly favored, favored, or strongly favored over another evaluation criterion. An evaluation criterion which is strongly favored over another suggests that, that criterion is significantly more important than the other. For the purpose of this study; quality will be slightly favored over patient reporting time, patient reporting time will be favored over cost, and cost will be strongly favored over reliability.

The level of favorability of an evaluation criterion is reflected in the actual weight that is assigned to that evaluation criterion. For example, quality is the most important evaluation criteria and results in a higher weighting than all others.

Quality is slightly favored over patient reporting time because without quality results the Pap Smear is useless. However, due to the fact that this study is designed to reduce patient reporting times, quality is only slightly favored over patient reporting times. Cost is certainly an important factor and must be considered. In relation to quality and patient reporting time it is less important. In relation to reliability however, it is very important. Due, in part, to the relationship between patient reporting times and reliability, cost stands somewhere in-between the two. As a result, patient reporting time is favored over cost, and cost is strongly favored over reliability.

The various alternatives, contract with the United States, do in-house, etc. will be assigned relative values. The relative value of each alternative is in relation to the other alternatives and will be determined as described earlier. A relative value of one is better than a five. For example, if we consider the criterion cost and the alternative to do nothing, we may get the following results. Since do nothing is the cheapest it will be assigned a relative value of one. If in-house is the costliest it may be assigned a 5, the costliest of the five options.

A decision matrix will be developed in which relative values and the evaluation criteria weights are linked. The relative values along with the weight of the evaluation criteria when applied systematically with the methods listed above will highlight one of

the alternatives as the apparent alternative of choice. That hypothesis will achieve a lower total score. Table 1 shows an example of a decision matrix.

This decision matrix will allow readers of this study to determine their own weighting of the evaluation criteria and by extrapolation, determine their best alternative. In this way, if the reader feels that cost is more important, the values can be exchanged, simple multiplication and addition performed and a new result identified. Additional decision matrices are located in Appendix 4. The values for the weights, in Table 1, are the actual weights that will be used in this study. These weights are based on the researchers bias that is noted earlier. The values of 1.00 are not actual. These relative values are for demonstration purposes only. The relative values will be determined by this study.

The last step in the process should be a reality check to determine the feasibility of each of the alternatives. The Pap Smear process action team for turn-around time improvement will be queried to assist with the reality check. Their responses will be recorded in the conclusions and recommendations of the study.

Table 1: Example Decision Matrix

Weights	5.26	4.00	1.52	1.00	
Alternatives / Criterion	Quality	Time	Cost	Reliability	Total Value
Do Nothing	1.00	1.00	1.00	1.00	11.78
Apply CQI Techniques	1.00	1.00	1.00	1.00	11.78
German Laboratory	1.00	1.00	1.00	1.00	11.78
U. S. Laboratory	1.00	1.00	1.00	1.00	11.78
Do In-house	1.00	1.00	1.00	1.00	11.78

CHAPTER 3

RESULTS

The determination of the best method of reducing Papanicolaou Smear patient reporting times at the 67th Combat Support Hospital, Wuerzburg Germany is the Do In-house method. Table 2 shows that the lowest value is shown by the Do In-house method. This method resulted in a total score of 23.22.

Table 2: Final Decision Matrix

Weights	**5.26**	**4.00**	**1.52**	**1.00**	
Alternatives / Criterion	**Quality**	**Time**	**Cost**	**Reliability**	**Total Value**
Do Nothing	2.50	5.00	1.50	5.00	40.44
Apply CQI Techniques	2.50	4.00	1.50	3.00	34.44
German Laboratory	5.00	3.00	5.00	4.00	49.92
U. S. Laboratory	2.50	2.00	4.00	1.50	28.74
Do In-house	2.50	1.00	3.00	1.50	**23.22**

The first criterion that was evaluated was quality. As stated earlier, the criterion for quality was whether the lab was CAP certified or not. The certified laboratory receives a 1 according to the rating scale. With this criterion the alternative do nothing will receive a 1, this is due to the fact that the laboratory at the LRMC is CAP certified. The alternative apply CQI techniques is also an alternative that performs the Pap Smear testing at LRMC as a result this option would also receive a 1. The next alternative is have the Pap Smears tested by a German laboratory. After consultation with LRMC and the 67th CSH's pathologist, the Bioscentia laboratory was selected as the laboratory for this option. The prior experience with this laboratory has been positive and both parties have been most pleased with this laboratory. Bioscentia, however, is not CAP certified. As a result this laboratory receives a 2. The next option is ship the Pap Smears to a laboratory in the United States. The laboratory currently under contract, Providence Laboratory Associates, is CAP certified. As a result of this certification, the alternative to ship Pap Smears to the United States also receives a 1. The last option is perform the Pap Smear testing in-house. This option also receives a 1, as the 67th CSH's laboratory is CAP certified.

This brings the researcher to a situation where more than one alternative has a 1 as the best solution. The MAPP program will not accept four 1's as a best answer. An average of the 1's must be taken based on the place each 1 takes. In this case the four 1's take up the 1st, 2nd, 3rd and 4th places. These places are added up with a result of 10.

The total is divided by the number of places and the resulting value for each alternative is 2.5. The last place is then reserved for the worst option, German laboratory, which receives a 5. Since Bioscentia was the only laboratory not CAP certified it was not necessary to determine the number of CAP certification consideration factors. The result of these calculations is shown in an abbreviated decision matrix in Table 3.

TABLE 3: DECISION MATRIX
QUALITY ONLY

Alternatives / Criterion	Quality
Do Nothing	2.50
Apply CQI Techniques	2.50
German Laboratory	5.00
U. S. Laboratory	2.50
Do In-house	2.50

The next evaluation criterion is time. The criterion time was measured in the number of days required to return a result of the Pap Smear to the patient. The patient turn-around for each of the options has been either calculated or estimated by the researcher using the methods indicated earlier.

The alternative do nothing resulted in a patient reporting time of 47.9 days. The results of this random sampling, in February, can be found in Appendix 1. This is the number previously reported, plus the time required to mail the results to the patient. The random sampling of mailing times resulted in an average time of 4.1 days. This figure added to the 43.8 days resulted in the 47.9 days. Recall that the figure of 43.8 days includes all steps in the process of performing Pap Smear testing. Included are the steps calculated in Appendix 1. The time also includes the other steps required by LRMC to complete testing such as, recording the test results into CHCS. This is the worst option and is assigned a relative value of 5.

The next alternative is apply CQI techniques. The Pap Smear process action team is still functioning at the time this report is published and they are considering other changes. The data used for determining patient reporting time was taken from the months of May and June. These numbers reflect a 10 percent random sample of all available Pap Smears that were shipped to LRMC during those months. The average patient reporting time for this period was 61.2 days and includes the mailing time. This is 13.3 days greater than for February. Although this number is higher than the option do nothing, the increase can be attributed to the time LRMC required to complete testing. Testing time average increased 16.6 days from February to the average time they required to test in May and June. Recall that the testing time assigned to LRMC, is the period of time encountered from the date the 67th CSH ships off the Pap Smears until the time LRMC certifies the results. Taking this increase into effect the actions of the Pap Smear PAT

were successful in reducing patient reporting times by 2.6 days. This number is significant in that it shows improvement in the process. In this case the improvement is in the handling of Pap Smears at the clinics and at the 67th CSH. The data representing the random samples taken in May and June are located in Appendix 5 and 6. This option was ranked fourth and as a result receives a relative value score of 4.

The next option is having the German laboratory Bioscentia perform the Pap smear testing. The patient turnaround time for this option was determined from past experience with Bioscentia. The testing and delivery phases were performed entirely by Bioscentia. This time was determined by taking an average of the times required for each individual batch sent to Bioscentia to be tested. On average Bioscentia takes 32.2 days to test and deliver Pap Smear results. This time is combined with an average delivery time and shipping time of 7.2 days, required by the 67th CSH to receive and ship Pap Smears. This number was determined during the months of May and June. Another 2.0 days must be added for the period of time required to input the results into CHCS. This step, mentioned earlier, is performed at LRMC. Bioscentia does not have this capability. Finally, the mailing time of 4.1 days is added for a grand total of 45.5 days. This option ranked third in patient reporting time and receives a relative value score of 3.

The fourth option is shipping the Pap Smears to the United States. The patient turnaround time for this option was determined from past experience of other laboratories using the laboratory in the United States. The testing phase alone takes 2.0 days. This time is combined with an average delivery time and shipping time of 7.2 days, required

by the 67th CSH. An additional 2.0 days is added to input the results into CHCS. The additional shipping time of four days is required to ship via United Parcel Service back and forth from Germany, this time is approximately 4.0 days. Finally, the mailing time of 4.1 days is added for a grand total of 19.3 days. This option ranked second in patient reporting time and receives a relative value score of 2.

The last option is performing Pap Smears in-house. The patient turnaround time for this option was determined from past experience of other high volume laboratory tests performed by the 67th CSH. The testing phase alone takes 2.0 days. For this study, the researcher will estimate a possible longer period of time and use the number of 3.0 days for testing. This time is combined with an average delivery time to the 67th CSH of 4.5 days and 2.0 days to input the results into CHCS. Finally, the mailing time of 4.1 days is added for a grand total of 13.6 days. This option ranked first in patient reporting time and receives a relative value score of 1. The results of the evaluation criterion patient reporting time are shown in Table 4.

The next evaluation criterion is Cost. The costs associated with each of these different alternatives vary markedly. It is important to note that the costs detailed here have been determined for a period of one year and based on a yearly requirement of 13,000 Pap Smears. A breakdown of cost by the different alternatives can be found in Appendix 7.

TABLE 4: DECISION MATRIX
PATIENT REPORTING TIME ONLY

Alternatives / Criterion	Time
Do Nothing	5.00
Apply CQI Techniques	4.00
German Laboratory	3.00
U. S. Laboratory	2.00
Do In-house	1.00

LRMC is currently budgeted to perform all Pap Smears for the European Health Services Support Area. Although the funds allocated to LRMC for this function belong to the EHSSA, it is pertinent to note that a certain percentage of those funds should theoretically belong to the 67th CSH for Pap Smear testing. Using MEPRS data for the month of the cumulative period 1 October 1994 through 31 March 1995 the total expenses for AP were $617,091. This is for all costs associated with AP tests including expenses for new equipment and other AP tests. In perspective, the Pap Smear is considered an inexpensive AP procedure. This is especially clear when compared to cut and frozen sections.

The total number of Pap Smears performed was 11,908. For each Pap Smear there are five associated procedures. Multiplying 11,908 by 5 yields a result of 59,540 weighted procedures. The LRMC cost per weighted procedure is $1.23. The cost for these weighted procedures is then $73,234.20. When divided by the numbers of Pap Smears completed, the cost per Pap Smears is determined. This resulting cost is $6.15 per Pap Smear. In theory then, for the 13,000 Pap Smears the 67th CSH could process annually they should receive approximately $79,950 in funding for the year. The reader must be aware that this is an estimate based on MEPRS data. The related calculations are shown below:

Number of total procedures: 11,908 X 5 = 59,540

Cost of total procedures: 59, 540 X $1.23 = $73,234.20

Cost per Pap Smear: $73,234.20/11,908 = $6.15

Funding required for the 67th CSH: $6.15 X 13,000 = $79,950

The first alternative is do nothing. On the surface there appears to be no costs associated with this option. There is, however, a continued cost of doing business. The most significant cost is that cost incurred to ship the Pap Smears to LRMC. Previous to the actions of the Pap Smear process action team, this cost was nonexistent. The Pap Smears were sent via courier three times a week. This procedure was deemed unacceptable and UPS is currently used. The time savings offered by UPS delivering Monday through Thursday warranted this change. The charges to UPS are incurred on a shipment basis, as Pap Smears are sent each day to LRMC. The cost of each shipment is

DM7.50, for a less than two kilogram shipment. No shipment has yet exceeded two kilograms. This amounts to DM30.00 a week and DM1560.00 for the year. This translates into a dollar value of $906.98 per year. As a result, costs of this alternative were found to be the least expensive and yields a relative value score of 1.

The second alternative is apply CQI techniques. To date, the only cost associated with this alternative is the one listed above. To review, this cost was $906.98 for the year. This is also the least expensive alternative and would receive a 1. Due to same score received by two alternatives, the scores must be averaged. As a result, both do nothing and apply CQI techniques receives a score of 1.5, half of the total of 1st and 2nd place.

The third alternative is send the Pap Smears to a German laboratory for testing. The cost associated with this option is the cost of testing. There are no delivery charges as Bioscentia will pick up and deliver the Pap Smears and the results. The cost per slide is reported as DM15. This results in a yearly cost of DM195,000. The conversion to dollars results in a yearly cost of $113,372.09. As this cost is highest the relative value score for this alternative is a 5.

The fourth alternative, perform the testing in a U.S. laboratory involves two major costs; the testing cost and the shipping cost. The testing cost for this alternative is $6.25 per Pap Smear slide. This equates to a yearly cost of $81,250.00. The cost of shipping the Pap Smears to the United States via UPS is approximately DM154 for a two kilogram box, and the requirement would be one box twice a week. This results in a cost of

DM308 or DM16,016 per year. This translates into $9,311.63 for the year. The total cost of this alternative would then be $90,561.63. Since this option is less costly than the previous option and receives a relative value score would be a 4.

The last option is to perform Pap Smear testing in-house. This option is the most complex and has many different costs associated with it. Those costs that need to be determined include salaries of new cytotechnologists, new equipment costs, and the cost of supplies.

To perform Pap Smears in-house would require two full time cytotechnologists. The normal cytotechnologist in civil service is a general service schedule employee (GS), grade 9. In the military, the rank of the equivalent is an enlisted soldier in the grade of sergeant or staff sergeant. Due to the apparent shortage of cytotechnologists in the military the costs should be based on a GS employee (7th Medical Command 1993, 12). The salary of a GS-9 currently stands at between $28,345 and $36,850. Taking an average the yearly salary of such an employee would be $32,587.50. To hire two cytotechnologists would then cost $65,195.00.

The cost of equipment would be limited to the cost of one slide stainer and two microscopes. The slide stainer of choice is made by Shandon Incorporated of England. The stainer is the Varistain XY model. This stainer meets the requirements of complex staining procedures such as Pap Smears. The purchase cost of this piece of equipment is DM36,708 or $21,341.86. The life expectancy of this piece of equipment is eight years. This translates to a yearly, purchase cost of $2667.73. The maintenance cost to maintain

this piece of equipment is $275.00 per year. The supplies required to maintain the slide stainer will run $253.82 a month and translates into a yearly cost of $3045.84 a year. The microscopes each cost DM13,591. The two microscopes cost DM27,182. Converted to dollars the cost for the two microscopes is $15,803.49. Life expectancy of a microscope is ten years. This equates to an annual cost of $1,580.35. Maintenance on the microscopes is minimal.

The total yearly cost for performing Pap Smears in-house is $72,763.92. This alternative ranks third in regards to the criterion cost. As a result this alternative receives a relative value score of 3. The result of the evaluation criterion cost is shown in Table 5.

TABLE 5: DECISION MATRIX
COST ONLY

Alternatives / Criterion	Cost
Do Nothing	1.50
Apply CQI Techniques	1.50
German Laboratory	5.00
U. S. Laboratory	4.00
Do In-house	3.00

The last evaluation criterion is reliability of continued service. As mentioned earlier it will be measured as the percentage of results in which the patient reporting time meets or exceeds the thirty day requirement. This was easily determined for the Pap Smears being sent to LRMC. However, the remaining alternatives must be determined by past experience. The German laboratories' and United States laboratories' determination of reliability required a review of the past history of turnaround times. In-house estimates will be based on the current laboratory turnaround time for AP tests.

The number of Pap Smears returned by LRMC meeting the standard varies from month to month. For example, during the month of February only four out of the sample fifty-four were returned within thirty days. This resulted in 7.4 percent being on time. In the months of May and June, the number completed was zero out of one hundred and ninety-eight. This resulted in 0.0 percent reported on time. The month of February will correspond to the alternative do nothing and result in a reliability rate of 7.4 percent.

The months of May and June will correspond to the alternative apply CQI techniques. Initially, the alternative apply CQI techniques resulted in a performance rate of 0.0 percent. This result however, does not reflect the effects of increased testing time required by LRMC in the months of May and June. This extra processing time if not compensated for would negate any improvements made by the CQI process. In May, LRMC required 8.0 additional days to complete testing when compared to the control period, February. The processing time in February was 30.18 days, and in May it was 38.17. In June, the corresponding increase in testing time was 25.2 days. To compensate

for the effect the increased testing time, 8.0 and 25.2 days respectively, will be subtracted from the May and June times.

When the additional testing days are subtracted the time saving effects of the CQI techniques are revealed, 27 out of 93 results in May met the standard. In June, the number was 38 out of 105. This represents a represents a combined total of 65 out of 198 meeting the standard, a reliability rate of 32.8 percent. As 7.4 percent is the worst number for reliability encountered, the alternative do nothing receives a relative value score of 5. The alternative apply CQI techniques with a 32.8 percent reliability rate scores a relative value score of 3.

The alternative process using German laboratories requires the use of data previously collected when Pap Smears were sent to Bioscentia. Those shipments resulted in four of the fourteen sample shipments meeting the thirty day standard. This results in a 28.6 percent reliability rate. The relative value score assigned for the alternative, perform testing in the German laboratory, is 4.

Using the projections based on patient reporting times, the alternative to use the United States laboratory has an expected reliability rate of 100 percent. This is due, in part, to the expected patient reporting time of 19.3 days. A similar solution is expected when performing the Pap Smears in-house. With a patient reporting times of these two alternatives, 19.3 and 13.6 days respectively, we would also expect that all the results would be received within thirty days. As a result of both alternatives receiving the best

scores, each will receive a relative value score of 1.5. Table 6 shows the final results of the results considering reliability only.

TABLE 6: DECISION MATRIX RELIABILITY ONLY

Alternatives / Criterion	Reliability
Do Nothing	5.00
Apply CQI Techniques	3.00
German Laboratory	4.00
U. S. Laboratory	1.50
Do In-house	1.50

The final decision matrix in Table 1 shows that the best solution to the problem of excessive Pap Smear reporting time is to do Pap Smear testing in-house. As shown earlier this method resulted in the lowest total that reflects the best method.

CHAPTER 4

DISCUSSION

The issue of Pap Smear reporting times has been in the American newsprint in Germany for a number of months. The topic has also been discussed at town meetings and commented on in the community newspaper. There appears to be a high level of concern on the part of the healthcare consumers and the communities here in Germany for reduced Pap Smear reporting times. The patients are not alone in the search for reduced times. The clinicians are also highly concerned about the long waits for results. But, there are other reasons to reduce this excessive patient reporting time. In truth, there are also legal and moral issues at stake.

The potential costs associated with a delay in the diagnosis of cervical cancer range in the millions of dollars. The additional costs in pain in suffering cannot ever be repaid. The repercussions of a delayed diagnosis range from more involved surgeries to chemotherapy and radiation therapies to control malignancies. In a study involving pregnant women with diagnosed cervical cancers the delays in treatment had various effects. The results did not lead the researchers to a strong conclusion concerning delays of treatment. In the study, the group of women opting for delays in treatment did not result in a further progression of the disease. As a precautionary measure the researchers came to recommend no delays in treatment when the woman is less than twenty weeks

gestational age. This recommendation reflects the medical industry's desire to not delay cancer treatments (Duggan and others 1993, 601).

Due to the concerns voiced above the Pap Smear PAT approached the issue. The team concentrated on the process by analyzing the steps in Pap Smear completion. Appendix 8 indicates the process as it existed prior to PAT involvement. At the time CHCS was not fully implemented. This necessitated the requirement for a paper trail to and from LRMC where test requests and results were sent by courier. In the end this proved inefficient.

As the PAT team became involved CHCS was fully implemented and the advantages of CHCS became evident. CHCS eliminated the need for a direct paper trail when reporting Pap Smear results. As a result, Pap Smear results were made available instantly upon certification. Another change initiated by the PAT was a direct processing system where the laboratory personnel at the 67th CSH no longer handled the Pap Smears of the outlying health clinics. Now they only consolidate the Pap Smears for shipment to LRMC. To speed the shipping process the United Parcel Service was hired to make near daily shipments. The result of the May and June turnaround times, although not reflecting an overall change in patient reporting time, did have a positive effect. In February, the time from obtaining the sample to shipment of the sample by the 67th CSH was 13.5 days. In May, this was reduced to 7.3 days, a reduction of over six 6 days. In June, total was reduced to 13.4 days, a reduction of only 0.1 days. The June results are attributed to the clinics holding the Pap Smears and not forwarding them to the 67th

CSH. The improvement was however still realized at the 67th CSH laboratory. The time from receipt of Pap Smears from the clinics to shipment to LRMC stayed fairly constant. In May the time was 2.8 days while in June the time was 3.2 days. An average improvement of 5.2 days better than recorded in February. The flowchart in Appendix 9 shows the refined Pap Smear process. It is hoped that as the process continues and the Pap Smear Clinic Log form is utilized, this portion of the patient reporting time will continue to drop.

The results of the data collected in February, May and June point to LRMC as the bottleneck in the process. The time required by LRMC increased throughout the period from February to June. Whereas in February it took 30.3 days from the time Pap Smears were shipped from the 67th CSH until the results were certified. In May, the results took 38.2 days. In June, the results took 55.3 days. These results show the need for change in the process of testing Pap Smears. The 67th CSH will never meet the 30 day DOD standard when LRMC takes on average 46.8 days to perform the testing alone.

The results of this study indicate that the option to perform Pap Smear testing in-house in the best option. Regardless of the option that is taken, the goal of any approach should be to adhere to the DOD standard of thirty days. This study pointed to two options capable of meeting that requirement. The overriding issue with each of these options is the cost involved in performing the Pap Smears in-house or by shipping to the United States. Surely there would be no problem if the budget were unlimited. The cost factor is easily dismissed when the costs of legal mitigation are factored into the equation.

Legal costs aside the need exists to meet the DOD standard for Pap Smear patient reporting time.

As of this writing the LRMC laboratory is again experiencing cytotechnologist shortages but, has realized it is responsible for the backlog. The new pathologist in charge of cytology has begun improving the process at LRMC and has shipped 2500 slides to the United States for testing. Until process changes take place, EHSSA as a whole can expect to see increased Pap Smear patient reporting times. The impetus is now to implement a system to reduce this trend and solve the problem.

CHAPTER 5

CONCLUSIONS AND RECOMMENDATIONS

This study concludes, for the present, the problem of excessive Pap Smear patient reporting times. This study offers viable alternatives that, if implemented, will result in reduced patient reporting times. The problem as addressed earlier has always been the combination of many related and unrelated factors. The Pap Smear PAT has shown that with persistence, worthwhile alternatives can be found to existing problems. If none of the alternatives recommended in this report are instituted, the Pap Smear PAT will continue to find opportunities for improvement in the process.

To date, the Pap Smear PAT has been successful. The PAT had affected a drop in patient reporting time when considering the parts of the process the PAT could influence. In February, it took 13.53 days from obtaining the sample to shipment to LRMC. With the improvements made, the corresponding time in May was 7.25 days, an improvement of nearly one week. In June the improvements were not realized due to clinics holding the Papa Smears. For our purposes, the improved process depicted in the flow chart found in Appendix 9 had a considerable impact. The improved flow made a significant contribution in reducing the Pap Smear patient reporting time. With continued progress and cooperation from the Outlying health clinics and LRMC, further progress can be made. However there appears to be a need for major changes in the existing process.

This last note is worthy of further comment. With similar attention taken by LRMC the time to perform the testing may also be reduced. If they show similar improvement to what was accomplished at the 67th CSH, this researcher expects that the patient reporting times will improve and possibly approach the thirty day time limit.

The use of the existing system is the appropriate choice as it is cost efficient. As mentioned earlier in the cost section there is a significant amount of funding which LRMC consumes performing Pap Smears testing, but at $6.15 per Pap Smear it is the least expensive method. The use of these funds by the 67th CSH to perform Pap Smear testing would make our costlier alternatives more appealing. The issue of funding is a highly political issue. This researcher cannot predict the possibility of any change in the current funding balance.

The applicability of this study to the Heidelberg MEDDAC (HMEDDAC) also appears relevant. The HMEDDAC has been functioning under very similar conditions that promoted this study. The results reported here could be readily adapted to their situation and the appropriate alternative adapted to their MEDDAC.

This study endeavors to make a number of recommendations:

1. That the PAT for Pap Smear patient reporting times remains an active team. The process that was instituted by the PAT should be continually monitored to ensure compliance with the DOD standard, but also to detect any other changes in the system that may effect outcomes. However, the PAT team should meet less often. This author would suggest once every two months or so. This is far less than when the team meet

twice a month. The team may be dissolved if recommendation to perform Pap Smear testing in-house is approved. The process will then be monitored by 67th CSH pathology and laboratory personnel.

2. That this study be used as an example for the other PATs to follow. Most importantly the data collection tool adopted here can be altered by other PATs and used to collect similar data.

3. That the Clinic Pap Smear Log developed by this author and the PAT be used as the basis of inspection. This command regularly performs Staff Assistance Visits and Command Inspections of the outlying clinics. The monitoring of this tool will ensure compliance with existing policy, JCAHO, and DOD standards.

APPENDIX 1

February 1995, Pap Smear Results

AD or Civilian	Clinic	Date Sample is Obtained	Date Sample Rec'd at WBZ	Date Accesioned by WBZ	Date Sample Sent To LRMC	Date Sample Certifiec by LRMC	Time of Harvest til Sample Received by WBZ	Time for WBZ to Ship Sample	Time to Ship WBZ til LRMC Certification	Total Days
AD	ABG	2/14/95	2/17/95	2/17/95	2/17/95	4/3/95	3	0	45	48
AD	FPC	2/24/95	2/27/95	2/27/95	2/27/95	3/24/95	3	0	25	28
AD	FPC	2/24/95	2/27/95	2/27/95	2/27/95	3/24/95	3	0	25	28
AD	GFW	1/25/95	2/7/95	2/13/95	2/14/95	3/17/95	13	7	31	51
AD	KTB	2/17/95	2/27/95	2/27/95	2/27/95	3/24/95	10	0	25	35
AD	KZG	1/18/95	1/21/95	2/10/95	2/10/95	3/9/95	3	20	27	50
AD	KZG	1/17/95	1/21/95	2/10/95	2/13/95	3/15/95	4	23	30	57
AD	NBG	1/13/95	1/17/95	2/3/95	2/6/95	2/28/95	4	14	25	49
AD	NBG	1/27/95	1/31/95	2/7/95	2/8/95	3/7/95	4	8	27	39
AD	NBG	2/10/95	2/13/95	2/14/95	2/14/95	3/24/95	3	1	38	42
AD	OB	1/23/95	1/27/95	2/7/95	2/8/95	3/9/95	4	12	29	45
AD	SFT	2/13/95	2/17/95	2/21/95	2/21/95	3/24/95	4	4	31	39
						Average	4.83	7.42	29.83	42.58
FM	OB	1/26/95	1/26/95	2/1/95	2/1/95	2/28/95	0	6	27	33
FM	ABG	1/19/95	1/20/95	2/6/95	2/7/95	2/28/95	1	18	21	40
FM	ABG	2/9/95	2/14/95	2/14/95	2/15/95	3/13/95	5	1	26	32
FM	BAB	1/12/95	1/18/95	2/8/95	2/10/95	3/15/95	6	23	33	62
FM	BBG	1/11/95	1/25/95	2/6/95	2/7/95	3/1/95	14	13	22	49
FM	BBG	1/27/95	2/1/95	2/7/95	2/8/95	3/6/95	5	7	26	38
FM	BBG	2/1/95	2/6/95	2/13/95	2/14/95	3/17/95	5	8	31	44
FM	BBG	2/7/95	2/10/95	2/14/95	2/14/95	3/24/95	3	4	38	45
FM	BBG	2/13/95	2/17/95	2/17/95	2/17/95	3/28/95	4	0	39	43
FM	BBG	2/22/95	2/27/95	2/27/95	2/27/95	3/24/95	5	0	25	30
FM	FPC	1/18/95	1/20/95	2/3/95	2/6/95	2/28/95	2	11	22	35
FM	FPC	1/31/95	2/3/95	2/7/95	2/8/95	3/6/95	3	5	26	34
FM	FPC	2/6/95	2/7/95	2/7/95	2/8/95	3/15/95	1	1	35	37
FM	FPC	1/27/95	1/27/95	2/10/95	2/13/95	3/15/95	0	17	30	47
FM	FPC	1/18/95	1/25/95	2/16/95	2/17/95	3/22/95	7	23	33	63
FM	GBS	1/18/95	2/6/95	2/6/95	2/10/95	3/15/95	19	4	33	56
FM	GBS	2/13/95	2/13/95	2/14/95	2/15/95	4/3/95	0	2	47	49
FM	GBS	2/22/95	2/27/95	2/27/95	2/27/95	3/24/95	5	0	25	30
FM	HHF	2/3/95	2/6/95	2/7/95	2/8/95	3/6/95	3	2	26	31
FM	HHF	1/27/95	2/1/95	2/7/95	2/8/95	3/13/95	5	7	33	45
FM	HHF	2/10/95	2/13/95	2/14/95	2/14/95	3/21/95	3	1	35	39
FM	KZG	1/6/95	1/13/95	2/8/95	2/10/95	4/6/95	7	29	55	91
FM	KZG	2/2/95	2/2/95	2/10/95	2/13/95	3/15/95	0	11	30	41
FM	KZG	1/24/95	2/2/95	2/13/95	2/14/95	3/15/95	9	12	29	50
FM	KZG	2/2/95	2/2/95	2/14/95	2/14/95	3/24/95	0	12	38	50
FM	NBG	2/2/95	2/6/95	2/13/95	2/13/95	3/15/95	4	7	30	41
FM	NBG	2/15/95	2/27/95	2/27/95	2/27/95	3/28/95	12	0	29	41
FM	OB	1/30/95	1/31/95	2/7/95	2/8/95	3/6/95	1	8	26	35
FM	SFT	1/11/95	1/17/95	2/6/95	2/7/95	3/1/95	6	21	22	49
FM	SFT	1/23/95	1/27/95	2/8/95	2/10/95	3/9/95	4	14	27	45
FM	SFT	1/24/95	1/27/95	2/8/95	2/10/95	3/10/95	3	14	28	45
FM	SFT	1/13/95	1/30/95	2/10/95	2/13/95	3/13/95	17	14	28	59
FM	SFT	1/4/95	1/30/95	2/10/95	2/13/95	3/14/95	26	14	29	69
FM	SFT	2/6/95	2/6/95	2/14/95	2/14/95	3/21/95	0	8	35	43
FM	SFT	2/13/95	2/13/95	2/15/95	2/15/95	3/24/95	0	2	37	39
FM	SFT	2/13/95	2/13/95	2/15/95	2/15/95	3/17/95	0	2	30	32
FM	SFT	2/13/95	2/17/95	2/21/95	2/21/95	3/22/95	4	4	29	37
FM	SFT	2/13/95	2/23/95	2/23/95	2/27/95	3/24/95	10	4	25	39
FM	VSK	1/25/95	1/30/95	2/7/95	2/8/95	3/6/95	5	9	26	40
FM	VSK	1/18/95	1/30/95	2/7/95	2/8/95	3/7/95	12	9	27	48
FM	VSK	2/2/95	2/7/95	2/13/95	2/13/95	3/15/95	5	6	30	41
FM	VSK	2/16/95	2/27/95	2/27/95	2/27/95	3/28/95	11	0	29	40
						Average	5.52	8.40	30.29	44.21
						Gross AVG	5.36	8.17	30.18	43.83

APPENDIX 2

CLINIC PAP SMEAR LOG Clinic__________ Month__________ Year__________

Name	FMP/LAST4	Accession Number	Phone	Date Obtained	Date Sent to WBG	Date Result Available	Date Pap Card Sent	Total Days	Follow Up		Results/Comments
									Y	N	
									Y	N	
									Y	N	
									Y	N	
									Y	N	
									Y	N	
									Y	N	
									Y	N	
									Y	N	
									Y	N	
									Y	N	
									Y	N	
									Y	N	
									Y	N	
									Y	N	
									Y	N	
									Y	N	
									Y	N	
									Y	N	

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APPENDIX 3

Pap Smear Mailing Time Test

To better determine the actual time it takes for patients to receive the results of Pap Smear testing you have been selected to participate in this sample mailing.

Please record the date you received this card and either return to CPT Meilinger by folding his address outside and placing in a mailbox or notify him by calling 350-3749. An answering machine is waiting to record your response if you choose to call. Please note the date you received the card.

Thank you for completing this card and participating in this study.

Date Pap Smear Test Card received:_____

Again thank you for your participation.

Civilian Phone Number 0931-804-3749

APPENDIX 3 Continued

DEPARTMENT OF THE ARMY
COMMANDER
67TH CSH
APO AE 09244
ATTN: CPT MEILINGER
OFFICIAL MAIL

DOD OFFICIAL INTRATHEATER MAIL

Fold here

Fold here

DEPARTMENT OF THE ARMY
COMMANDER
67TH CSH
APO AE 09244
ATTN: CPT MEILINGER
OFFICIAL MAIL

DOD OFFICIAL INTRATHEATER MAIL

CPT CHRIS MEILINGER
67TH CSH
BOX 243
APO AE 09244

APPENDIX 4

Decision Matrix - All Weighting Criterion Equal

Weights	**1.0**	**1.0**	**1.0**	**1.0**	
Alternatives / Criterion	**Quality**	**Time**	**Cost**	**Reliability**	**Total Value**
Do Nothing	2.5	5.00	1.5	5.0	14.0
Apply CQI	2.5	4.0	1.5	3.0	11.0
German Laboratory	5.0	3.0	5.0	4.0	17.0
U. S. Laboratory	2.5	2.0	4.0	1.5	10.0
Do In-house	2.5	1.0	3.0	1.5	8.0

Decision Matrix - Descending Weights, First Criterion Slightly Favored over Second Criterion and Favored over Third Criterion and Strongly Favored over Last Criterion

Weights	**4.9**	**2.9**	**1.7**	**1.0**	
Alternatives / Criterion	**Quality**	**Time**	**Cost**	**Reliability**	**Total Value**
Do Nothing	2.5	5.0	1.5	5.0	34.3
Apply CQI	2.5	4.0	1.5	3.0	29.4
German Laboratory	5.0	3.0	5.0	4.0	45.6
U. S. Laboratory	2.5	2.0	4.0	1.5	26.3
Do In-house	2.5	1.0	3.0	1.5	21.7

APPENDIX 4 Continued

Decision Matrix - First Two Criterion Equal and Favored over Second Two Equal Criterion

Weights	**3.0**	**3.0**	**1.0**	**1.0**	
Alternatives / Criterion	**Quality**	**Time**	**Cost**	**Reliability**	**Total Value**
Do Nothing	2.5	5.0	1.5	5.0	29.0
Apply CQI	2.5	4.0	1.5	3.0	24.0
German Laboratory	5.0	3.0	5.0	4.0	33.0
U. S. Laboratory	2.5	2.0	4.0	1.5	19.0
Do In-house	2.5	1.0	3.0	1.5	15.0

Decision Matrix - First Criteria Strongly Favored over Three Equal Criterion

Weights	**3.0**	**1.0**	**1.0**	**1.0**	
Alternatives / Criterion	**Quality**	**Time**	**Cost**	**Reliability**	**Total Value**
Do Nothing	2.5	5.0	1.5	5.0	19.0
Apply CQI	2.5	4.0	1.5	3.0	16.0
German Laboratory	5.0	3.0	5.0	4.0	27.0
U. S. Laboratory	2.5	2.0	4.0	1.5	15.0
Do In-house	2.5	1.0	3.0	1.5	13.0

APPENDIX 4 Continued

Decision Matrix - First Two Criterion Equal and Favored over Third Criteria and Slightly Favored over Last Criteria

Weights	**4.4**	**4.4**	**1.9**	**1.0**	
Alternatives / Criterion	**Quality**	**Time**	**Cost**	**Reliability**	**Total Value**
Do Nothing	2.5	5.0	1.5	5.0	40.7
Apply CQI	2.5	4.0	1.5	3.0	34.2
German Laboratory	5.0	3.0	5.0	4.0	47.6
U. S. Laboratory	2.5	2.0	4.0	1.5	28.0
Do In-house	2.5	1.0	3.0	1.5	21.9

Decision Matrix - First Criteria Favored over Second Criteria and Favored over Last Two Equal Criteria

Weights	**4.9**	**2.4**	**1.0**	**1.0**	
Alternatives / Criterion	**Quality**	**Time**	**Cost**	**Reliability**	**Total Value**
Do Nothing	2.5	5.0	1.5	5.0	31.0
Apply CQI	2.5	4.0	1.5	3.0	26.6
German Laboratory	5.0	3.0	5.0	4.0	40.8
U. S. Laboratory	2.5	2.0	4.0	1.5	22.7
Do In-house	2.5	1.0	3.0	1.5	19.2

APPENDIX 5

May 1995, Pap Smear Results

AD or Civilian	Clinic	Date Obtained	Date Sample Rec'd at WBZ	Date Accessioned by WBZ	Date Sample Sent To LRMC	Date Sample Certified by LRMC	Time of Harvest til Sample Received by WBZ	Time for WBZ to Ship Sample	Time to Ship WBZ til LRMC Certification	Total Days
AD	FPC	5/1/95	5/2/95	5/2/95	5/9/95	6/6/95	1	7	28	36
AD	OB	5/1/95	5/2/95	5/3/95	5/8/95	6/6/95	1	7	28	36
AD	SFT	4/24/95	5/3/95	5/3/95	5/6/95	6/6/95	9	3	31	43
AD	HHF	4/28/95	5/3/95	5/4/95	5/6/95	6/5/95	5	3	30	38
AD	KTB	5/3/95	5/5/95	5/6/95	5/6/95	6/5/95	2	1	30	33
AD	KTB	5/2/95	5/5/95	5/6/95	5/9/95	7/21/95	3	4	73	80
AD	KTB	5/8/95	5/9/95	5/10/95	5/10/95	6/9/95	1	1	30	32
AD	KTB	5/8/95	5/9/95	5/10/95	5/10/95	6/9/95	1	1	30	32
AD	KZG	4/26/95	5/9/95	5/10/95	5/10/95	6/12/95	13	1	33	47
AD	KZG	5/2/95	5/9/95	5/10/95	5/11/95	6/12/95	7	2	32	41
AD	KZG	5/2/95	5/9/95	5/10/95	5/11/95	6/12/95	7	2	32	41
AD	FPC	5/10/95	5/10/95	5/11/95	5/12/95	6/22/95	0	2	41	43
AD	FPC	5/10/95	5/10/95	5/11/95	5/12/95	6/23/95	0	2	42	44
AD	BAM	5/1/95	5/10/95	5/11/95	5/12/95	6/22/95	9	2	41	52
AD	FPC	5/11/95	5/11/95	5/12/95	5/12/95	6/23/95	0	1	42	43
AD	OB	5/10/95	5/12/95	5/13/95	5/13/95	6/23/95	2	1	41	44
AD	OB	5/11/95	5/12/95	5/13/95	5/13/95	6/23/95	1	1	41	43
AD	KTB	5/9/95	5/15/95	5/15/95	5/17/95	6/13/95	6	2	27	35
AD	FPC	5/15/95	5/15/95	5/16/95	5/17/95	6/22/95	0	2	36	38
AD	FPC	5/15/95	5/15/95	5/16/95	5/17/95	6/22/95	0	2	36	38
AD	SFT	5/10/95	5/15/95	5/16/95	5/17/95	6/23/95	5	2	37	44
AD	FPC	5/16/95	5/16/95	5/17/95	5/17/95	7/27/95	0	1	71	72
AD	FPC	5/17/95	5/17/95	5/18/95	5/22/95	6/23/95	0	5	32	37
AD	OB	5/16/95	5/20/95	5/20/95	5/22/95	6/27/95	4	2	36	42
AD	FPC	5/19/95	5/22/95	5/23/95	5/31/95	7/28/95	3	9	58	70
AD	FPC	5/26/95	5/26/95	5/26/95	5/31/95	7/14/95	0	5	44	49
AD	FPC	5/30/95	5/30/95	5/31/95	5/31/95	7/14/95	0	1	44	45
AD	ABG	5/17/95	5/22/95	5/22/95	5/24/95	7/7/95	5	2	44	51
						Average	3.04	2.64	38.93	44.61
FM	KZG	4/20/95	5/1/95	5/1/95	5/9/95	6/6/95	11	8	28	47
FM	FPC	4/24/95	5/1/95	5/1/95	5/9/95	6/6/95	7	8	28	43
FM	KTB	4/28/95	5/2/95	5/3/95	5/9/95	6/6/95	4	7	28	39
FM	KTB	5/1/95	5/2/95	5/3/95	5/9/95	6/6/95	1	7	28	36
FM	NBG	5/2/95	5/2/95	5/3/95	5/9/95	6/6/95	0	7	28	35
FM	SFT	4/20/95	5/2/95	5/3/95	5/6/95	6/6/95	12	4	31	47
FM	SFT	4/26/95	5/2/95	5/3/95	5/6/95	6/14/95	6	4	39	49
FM	SFT	4/28/95	5/3/95	5/3/95	5/6/95	6/14/95	5	3	39	47
FM	BAD	5/2/95	5/3/95	5/4/95	5/6/95	6/14/95	1	3	39	43
FM	NBG	5/2/95	5/4/95	5/5/95	5/6/95	6/5/95	2	2	30	34
FM	ABG	5/4/95	5/5/95	5/6/95	5/6/95	6/5/95	1	1	30	32
FM	KTB	5/3/95	5/5/95	5/6/95	5/6/95	6/13/95	2	1	38	41
FM	ILL	5/3/95	5/5/95	5/6/95	5/9/95	6/13/95	2	4	35	41
FM	ILL	4/27/95	5/5/95	5/6/95	5/9/95	6/13/95	8	4	35	47
FM	HHF	5/5/95	5/9/95	5/9/95	5/9/95	6/14/95	4	0	36	40
FM	HHF	5/5/95	5/8/95	5/9/95	5/9/95	6/13/95	3	1	35	39
FM	GBS	5/1/95	5/8/95	5/9/95	5/9/95	6/14/95	7	1	36	44
FM	FPC	5/5/95	5/8/95	5/9/95	5/9/95	6/14/95	3	1	36	40
FM	FPC	5/8/95	5/8/95	5/9/95	5/9/95	6/14/95	0	1	36	37
FM	FPC	5/8/95	5/8/95	5/9/95	5/10/95	6/14/95	0	2	35	37
FM	BAM	5/4/95	5/8/95	5/9/95	5/10/95	6/8/95	4	2	30	36
FM	OB	5/8/95	5/9/95	5/10/95	5/10/95	6/13/95	1	1	34	36
FM	KZG	4/25/95	5/9/95	5/10/95	5/10/95	6/12/95	14	1	33	48
FM	KZG	4/27/95	5/9/95	5/10/95	5/10/95	6/12/95	12	1	33	46
FM	KZG	4/27/95	5/9/95	5/10/95	5/10/95	6/12/95	12	1	33	46
FM	KZG	5/3/95	5/9/95	5/10/95	5/11/95	6/12/95	6	2	32	40
FM	SFT	5/8/95	5/9/95	5/11/95	5/11/95	6/12/95	1	2	32	35
FM	SFT	5/4/95	5/9/95	5/11/95	5/11/95	6/9/95	5	2	29	36
FM	SFT	5/3/95	5/9/95	5/11/95	5/11/95	6/9/95	6	2	29	37
FM	SFT	5/1/95	5/9/95	5/11/95	5/11/95	6/9/95	8	2	29	39
FM	SFT	5/3/95	5/9/95	5/11/95	5/11/95	6/9/95	6	2	29	37
FM	SFT	5/8/95	5/9/95	5/11/95	5/11/95	6/15/95	1	2	35	38
FM	OB	4/25/95	5/9/95	5/11/95	5/11/95	6/6/95	14	2	25	42
FM	BAM	5/2/95	5/10/95	5/11/95	5/12/95	6/22/95	8	2	41	51
FM	BAM	4/27/95	5/10/95	5/11/95	5/12/95	6/22/95	13	2	41	56
FM	BAM	5/3/95	5/10/95	5/11/95	5/12/95	6/22/95	7	2	41	50
FM	BAD	5/8/95	5/10/95	5/12/95	5/12/95	6/23/95	2	2	42	48
FM	ABG	5/4/95	5/11/95	5/12/95	5/13/95	6/23/95	7	2	41	50
FM	ABG	5/8/95	5/11/95	5/12/95	5/13/95	6/23/95	3	2	41	46
FM	VSK	4/26/95	5/11/95	5/12/95	5/13/95	6/23/95	15	2	41	58
FM	VSK	4/27/95	5/11/95	5/12/95	5/13/95	6/23/95	14	2	41	57
FM	VSK	5/4/95	5/11/95	5/12/95	5/13/95	6/23/95	7	2	41	50
FM	VSK	5/4/95	5/11/95	5/12/95	5/13/95	6/26/95	7	2	44	53
FM	NBG	5/10/95	5/11/95	5/12/95	5/13/95	6/23/95	1	2	41	44
FM	OB	5/10/95	5/12/95	5/13/95	5/13/95	6/23/95	2	1	41	44
FM	NBG	5/12/95	5/15/95	5/15/95	5/17/95	6/14/95	3	2	28	33
FM	SFT	5/8/95	5/15/95	5/16/95	5/17/95	6/23/95	7	2	37	46
FM	SFT	4/24/95	5/15/95	5/16/95	5/17/95	6/23/95	21	2	37	60
FM	SFT	5/3/95	5/15/95	5/16/95	5/17/95	7/27/95	12	2	71	85
FM	SFT	5/15/95	5/16/95	5/17/95	5/17/95	7/27/95	1	1	71	73
FM	SFT	5/15/95	5/17/95	5/17/95	5/17/95	6/23/95	2	0	37	39
FM	FPC	5/16/95	5/16/95	5/17/95	5/17/95	6/23/95	0	1	37	38
FM	FPC	5/18/95	5/18/95	5/19/95	5/22/95	6/23/95	0	4	32	36
FM	FPC	5/19/95	5/19/95	5/20/95	5/22/95	6/23/95	0	3	32	35
FM	ABG	5/19/95	5/22/95	5/22/95	5/24/95	7/7/95	3	2	44	49
FM	ABG	5/11/95	5/22/95	5/22/95	5/24/95	7/7/95	11	2	44	57
FM	ABG	5/18/95	5/22/95	5/22/95	5/24/95	6/28/95	4	2	35	41
FM	SFT	5/22/95	5/22/95	5/22/95	5/24/95	7/14/95	0	2	51	53
FM	SFT	5/17/95	5/22/95	5/22/95	5/24/95	7/14/95	5	2	51	58
FM	SFT	5/17/95	5/22/95	5/22/95	5/24/95	7/10/95	5	2	47	54
FM	BAD	5/17/95	5/17/95	5/23/95	5/31/95	7/19/95	0	14	49	63
FM	FPC	5/22/95	5/22/95	5/23/95	5/31/95	7/14/95	0	9	44	53
FM	FPC	5/23/95	5/23/95	5/24/95	5/31/95	7/14/95	0	8	44	52
FM	KZG	5/24/95	5/24/95	5/25/95	5/31/95	7/14/95	0	7	44	51
FM	BAD	5/23/95	5/24/95	5/25/95	5/31/95	7/14/95	1	7	44	52
						Average	4.45	2.82	38.06	45.33
						Gross AVG	4.48	2.77	38.17	45.43

APPENDIX 6

June 1995, Pap Smear Results

AD or Civilian	Clinic	Date Obtained	Date Sample Rec'd at WBZ	Date Accessioned	Date Sample Sent To LRMC	Date Sample Certified by LRMC	Time of Harvest til Sample Received by WBZ	Time for WBZ to Ship Sample	Time to Ship WBZ til LRMC Certification	Total Days
AD	ABG	6/5/95	6/20/95	6/22/95	6/22/95	7/28/95	15	2	36	53
AD	BAD	6/8/95	6/14/95	6/15/95	6/19/95	8/15/95	6	5	57	68
AD	BAD	6/22/95	6/26/95	6/26/95	7/7/95	8/29/95	4	11	53	68
AD	FPC	5/31/95	6/2/95	6/2/95	6/19/95	7/27/95	2	17	38	57
AD	FPC	6/7/95	6/9/95	6/9/95	6/19/95	7/27/95	2	10	38	50
AD	FPC	6/13/95	6/14/95	6/14/95	6/19/95	7/27/95	1	5	38	44
AD	FPC	6/12/95	6/14/95	6/14/95	6/19/95	7/31/95	2	5	42	49
AD	FPC	6/21/95	6/22/95	6/22/95	6/26/95	7/31/95	1	4	35	40
AD	FPC	6/22/95	6/23/95	6/23/95	6/26/95	7/29/95	1	3	33	37
AD	GBS	6/7/95	6/9/95	6/9/95	6/12/95	11/13/95	2	3	154	159
AD	GRF	6/13/95	6/16/95	6/13/95	6/22/95	7/31/95	3	6	39	48
AD	ILL	6/6/95	6/21/95	6/21/95	6/22/95	8/2/95	15	1	41	57
AD	KZG	5/16/95	6/20/95	6/15/95	6/20/95	7/31/95	35	0	41	76
AD	KZG	5/19/95	6/20/95	6/15/95	6/20/95	8/1/95	32	0	42	74
AD	KZG	6/13/95	6/20/95	6/15/95	6/20/95	7/28/95	7	0	38	45
AD	KZG	6/14/95	6/20/95	6/15/95	6/27/95	8/29/95	6	7	63	76
AD	KZG	5/18/95	6/20/95	6/15/95	6/22/95	8/15/95	33	2	54	89
AD	OB	6/2/95	6/7/95	6/7/95	6/19/95	7/27/95	5	12	38	55
AD	OB	6/6/95	6/13/95	6/14/95	6/19/95	7/28/95	7	6	39	52
AD	OB	6/12/95	6/15/95	6/15/95	6/19/95	8/1/95	3	4	43	50
AD	SCH	6/27/95	7/5/95	6/30/95	7/6/95	11/13/95	8	1	130	139
AD	SCH	6/12/95	6/16/95	6/14/95	6/19/95	7/27/95	4	3	38	45
AD	SCH	6/2/95	6/7/95	6/7/95	6/7/95	7/23/95	5	0	46	51
AD	SCH	5/24/95	6/7/95	6/7/95	6/7/95	7/23/95	14	0	46	60
						Average	9.88	4.44	50.92	64.26
FM	ABG	6/13/95	6/20/95	6/22/95	6/22/95	7/31/95	7	2	39	48
FM	ABG	6/8/95	6/20/95	6/22/95	6/22/95	7/31/95	12	2	39	53
FM	ABG	6/1/95	6/7/95	6/7/95	6/7/95	7/23/95	6	0	46	52
FM	BAD	5/25/95	6/7/95	6/7/95	6/19/95	7/27/95	13	12	38	63
FM	BBG	6/5/95	6/9/95	6/9/95	6/12/95	7/21/95	4	3	39	46
FM	BBG	6/6/95	6/9/95	6/9/95	6/12/95	7/23/95	3	3	41	47
FM	BBG	5/9/95	6/5/95	6/4/95	6/6/95	7/21/95	27	1	45	73
FM	BBG	5/12/95	6/5/95	6/4/95	6/6/95	7/21/95	24	1	45	70
FM	BBG	5/15/95	6/5/95	6/4/95	6/6/95	7/21/95	21	1	45	67
FM	BBG	5/22/95	6/5/95	6/4/95	6/6/95	7/23/95	14	1	47	62
FM	BBG	5/18/95	6/5/95	6/4/95	6/6/95	8/1/95	18	1	56	75
FM	BBG	5/26/95	6/5/95	6/4/95	6/6/95	8/1/95	10	1	56	67
FM	BBG	5/23/95	6/5/95	6/4/95	6/6/95	8/1/95	13	1	56	70
FM	FPC	5/31/95	6/2/95	6/2/95	6/19/95	7/27/95	2	17	38	57
FM	FPC	6/5/95	6/7/95	6/7/95	6/19/95	7/24/95	2	12	35	49
FM	FPC	6/2/95	6/7/95	6/7/95	6/19/95	7/27/95	5	12	38	55
FM	FPC	6/9/95	6/14/95	6/14/95	6/19/95	7/31/95	5	5	42	52
FM	FPC	6/19/95	6/20/95	6/20/95	6/26/95	7/26/95	1	6	32	39
FM	FPC	6/19/95	6/20/95	6/20/95	6/26/95	7/28/95	1	6	32	39
FM	FPC	6/16/95	6/20/95	6/20/95	6/26/95	7/31/95	4	6	35	45
FM	FPC	6/20/95	6/22/95	6/22/95	6/26/95	7/31/95	2	4	35	41
FM	FPC	6/21/95	6/23/95	6/23/95	6/26/95	7/29/95	2	3	33	38
FM	GRF	6/28/95	6/30/95	6/29/95	7/6/95	8/29/95	2	6	54	62
FM	GRF	6/26/95	6/30/95	6/29/95	7/6/95	8/29/95	4	6	54	64
FM	GRF	6/19/95	6/21/95	6/20/95	6/22/95	8/15/95	2	1	54	57
FM	GRF	5/31/95	6/16/95	6/13/95	6/22/95	7/26/95	16	6	34	56
FM	GRF	5/31/95	6/16/95	6/13/95	6/22/95	8/1/95	16	6	40	62
FM	HHF	6/16/95	6/19/95	6/20/95	6/20/95	11/13/95	3	1	146	150
FM	ILL	6/21/95	7/5/95	6/28/95	7/7/95	9/3/95	14	2	58	74
FM	ILL	5/23/95	6/21/95	6/21/95	6/22/95	8/2/95	29	1	41	71
FM	KTB	6/28/95	6/30/95	6/30/95	7/6/95	8/29/95	2	6	54	62
FM	KTB	5/30/95	6/2/95	6/2/95	6/6/95	8/2/95	3	4	57	64
FM	KTB	6/19/95	6/20/95	6/20/95	6/22/95	7/31/95	1	2	39	42
FM	KZG	6/22/95	6/27/95	6/26/95	6/27/95	8/29/95	5	0	63	68
FM	KZG	6/22/95	6/27/95	6/26/95	6/27/95	9/5/95	5	0	70	75
FM	KZG	6/22/95	6/27/95	6/26/95	6/27/95	9/5/95	5	0	70	75
FM	KZG	6/8/95	6/20/95	6/19/95	6/22/95	8/15/95	12	2	54	68
FM	KZG	6/15/95	6/20/95	6/19/95	6/22/95	8/15/95	5	2	54	61
FM	KZG	5/16/95	6/20/95	6/15/95	6/20/95	7/28/95	35	0	38	73
FM	KZG	5/16/95	6/20/95	6/15/95	6/27/95	9/5/95	35	7	70	112
FM	KZG	4/28/95	6/20/95	6/16/95	6/27/95	9/5/95	53	7	70	130
FM	KZG	6/8/95	6/20/95	6/16/95	6/22/95	8/15/95	12	2	54	68
FM	KZG	5/10/95	6/20/95	6/15/95	6/20/95	7/28/95	41	0	38	79
FM	KZG	5/17/95	6/20/95	6/16/95	6/20/95	7/31/95	34	0	41	75
FM	KZG	5/26/95	6/20/95	6/16/95	6/20/95	8/1/95	25	0	42	67
FM	KZG	5/25/95	6/20/95	6/16/95	6/20/95	7/28/95	28	0	38	64
FM	KZG	6/15/95	6/20/95	6/19/95	6/22/95	8/15/95	5	2	54	61
FM	KZG	5/10/95	6/20/95	6/15/95	6/22/95	8/15/95	41	2	54	97
FM	NBG	6/13/95	6/20/95	6/19/95	6/22/95	8/13/95	7	2	52	61
FM	OB	6/14/95	6/14/95	6/14/95	6/19/95	7/31/95	0	5	42	47
FM	OB	6/6/95	6/14/95	6/14/95	6/19/95	7/28/95	8	5	39	52
FM	SCH	6/21/95	7/5/95	6/30/95	7/6/95	11/13/95	14	1	130	145
FM	SCH	6/27/95	7/5/95	6/30/95	7/6/95	11/13/95	8	1	130	139
FM	SCH	6/19/95	7/5/95	6/30/95	7/6/95	11/13/95	16	1	130	147
FM	SCH	6/20/95	7/5/95	6/30/95	7/6/95	11/13/95	15	1	130	146
FM	SCH	6/21/95	7/5/95	6/30/95	7/6/95	11/13/95	14	1	130	145
FM	SCH	6/15/95	7/5/95	6/30/95	7/6/95	11/13/95	20	1	130	151
FM	SCH	6/21/95	7/5/95	6/30/95	7/6/95	11/13/95	14	1	130	145
FM	SCH	6/12/95	6/16/95	6/14/95	6/19/95	7/28/95	4	3	39	46
FM	SCH	6/12/95	6/16/95	6/14/95	6/19/95	7/28/95	4	3	39	46
FM	SCH	6/7/95	6/8/95	6/8/95	6/12/95	7/21/95	1	4	39	44
FM	SCH	6/7/95	6/8/95	6/8/95	6/12/95	7/21/95	1	4	39	44
FM	SCH	6/6/95	6/7/95	6/6/95	6/7/95	7/28/95	1	0	51	52
FM	SCH	5/26/95	6/7/95	6/6/95	6/7/95	8/9/95	12	0	63	75
FM	SCH	5/31/95	6/7/95	6/6/95	6/7/95	7/23/95	7	0	46	53
FM	SCH	6/6/95	6/7/95	6/6/95	6/7/95	8/9/95	1	0	63	64
FM	SCH	6/5/95	6/7/95	6/7/95	6/7/95	7/26/95	2	0	49	51
FM	SCH	5/26/95	6/7/95	6/7/95	6/7/95	7/23/95	12	0	46	58
FM	SCH	5/31/95	6/7/95	6/7/95	6/7/95	7/23/95	7	0	46	53
FM	SCH	6/2/95	6/7/95	6/7/95	6/7/95	8/9/95	5	0	63	68
FM	SCH	6/2/95	6/7/95	6/7/95	6/7/95	7/23/95	5	0	46	51
FM	SCH	5/24/95	6/7/95	6/7/95	6/7/95	7/26/95	14	0	49	63
FM	VSK	6/20/95	6/30/95	6/29/95	7/6/95	9/7/95	10	6	63	79
FM	VSK	6/28/95	6/30/95	6/29/95	7/6/95	9/3/95	2	6	59	67
FM	VSK	6/21/95	6/23/95	6/21/95	6/26/95	8/29/95	2	3	64	69
FM	VSK	6/21/95	6/23/95	6/21/95	6/26/95	8/25/95	2	3	60	65
FM	VSK	6/21/95	6/23/95	6/21/95	6/26/95	8/25/95	2	3	60	65
FM	VSK	6/21/95	6/23/95	6/21/95	6/26/95	8/29/95	2	3	64	69
FM	VSK	6/22/95	6/23/95	6/21/95	6/23/95	8/29/95	1	0	67	68
FM	VSK	6/15/95	6/21/95	6/19/95	6/22/95	8/4/95	6	1	43	50
FM	VSK	6/8/95	6/21/95	6/19/95	6/22/95	7/31/95	13	1	39	53
						Average	10.60	2.77	66.70	70.07
						Gross AVG	10.20	3.16	65.34	69.70

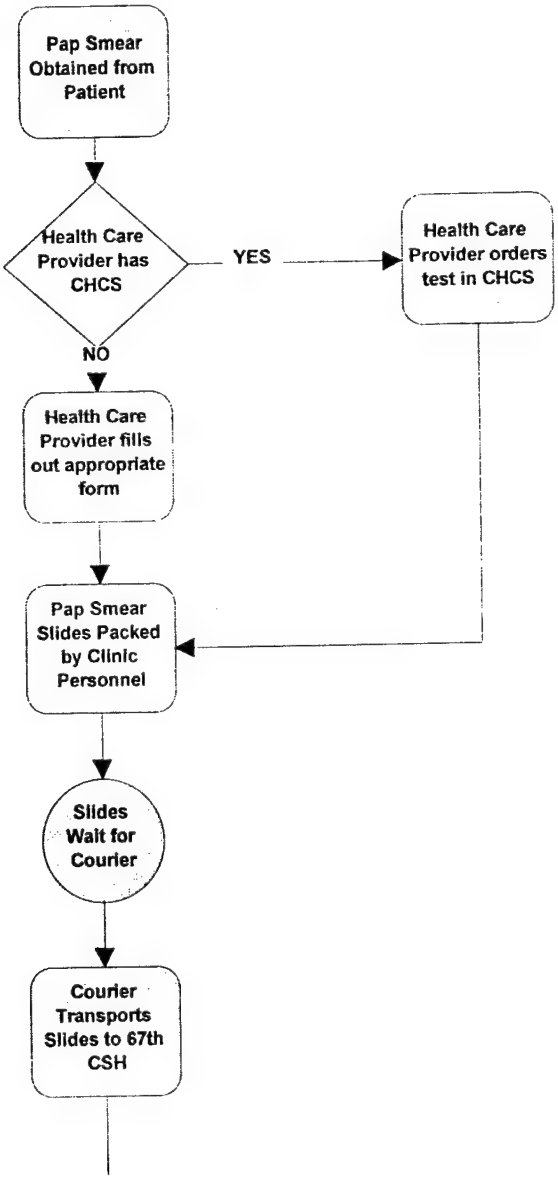
APPENDIX 7

Cost Breakdown by Alternative

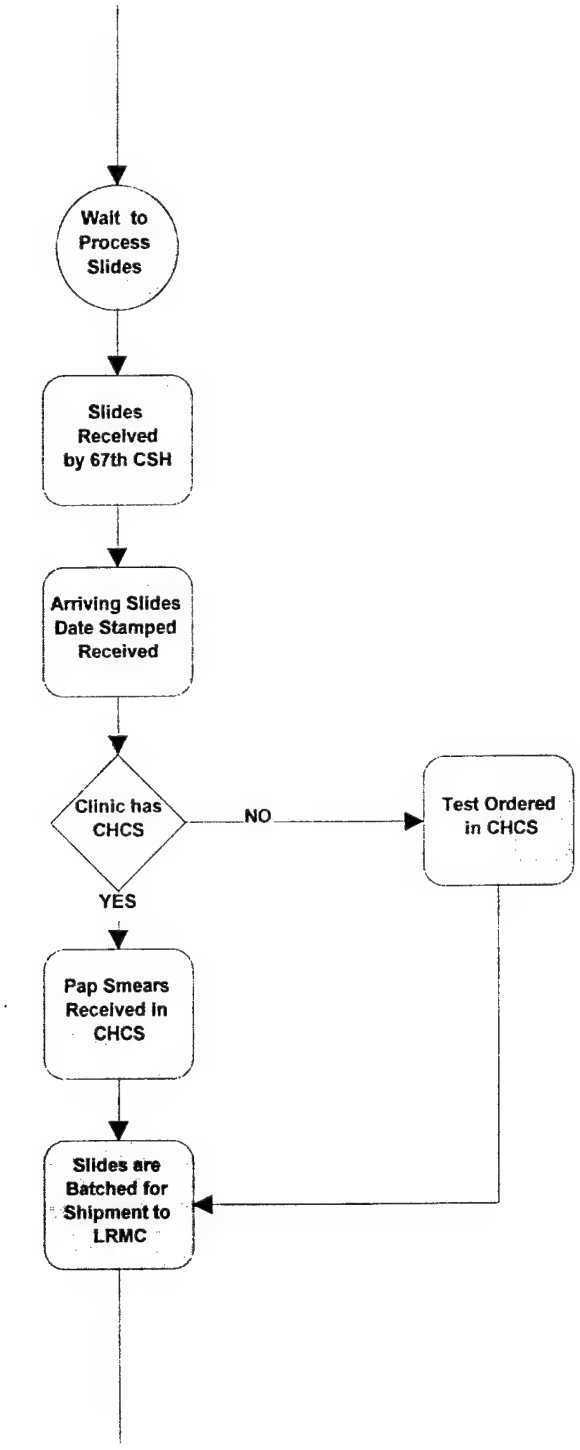
	Do Nothing	CQI Techniques	German Laboratory	U.S. Laboratory	Do In-house
Shipping Costs to 67th CSH	Minimal and Equal	Minimal and Equal	Minimal and Equal	Minimal and Equal	Minimal and Equal
Cost per Test	$6.15	$6.15	DM15 or $8.72	$6.25	Unknown
Cost per Year with 13,000 Tests	$79,950.00	$79,950.00	DM195,000 or $113,372.09	$81,250.00	Unknown
Shipping Costs to LRMC per Shipment/Week	DM 7.50/30.00 or $4.36/17.44	DM7.50/30.00 or $4.36/17.44	Included in Testing Fee	Not Applicable	Not Applicable
Shipping Costs to LRMC per Annum	DM1560.00 or $906.98	DM1560.00 or $906.98	Not Applicable	Not Applicable	Not Applicable
Shipping Costs to German Laboratory	Not Applicable	Not Applicable	Included in Price	Not Applicable	Not Applicable
Shipping Costs to the U.S. per Shipment/Week	Not Applicable	Not Applicable	Not Applicable	DM154/308 or $89.54/179.07	Not Applicable
Shipping Costs to U.S. per Annum	Not Applicable	Not Applicable	Not Applicable	$9,311.63	Not Applicable
New Equipment Cost-Varistain Stainer	Not Applicable	Not Applicable	Not Applicable	Not Applicable	DM36,708.00 or $21,341,86
New Equipment Cost-Two New Microscopes	Not Applicable	Not Applicable	Not Applicable	Not Applicable	DM27,182 or $15,803.49
Prorated New Equipment Costs for One year	Not Applicable	Not Applicable	Not Applicable	Not Applicable	DM63,890.00 or $4,248.08
Personnel Cost for One Year	Not Applicable	Not Applicable	Not Applicable	Not Applicable	$65,195.00
Supply Costs for One Year	Not Applicable	Not Applicable	Not Applicable	Not Applicable	$3,045.84
Maintenance Costs for One Year	Not Applicable	Not Applicable	Not Applicable	Not Applicable	$275.00
Total Cost $	**$80,858.98**	**$80,856.98**	**$113,372.09**	**$90,561.63**	**$72,763.92**

APPENDIX 8

ORIGINAL PAP SMEAR FLOWCHART

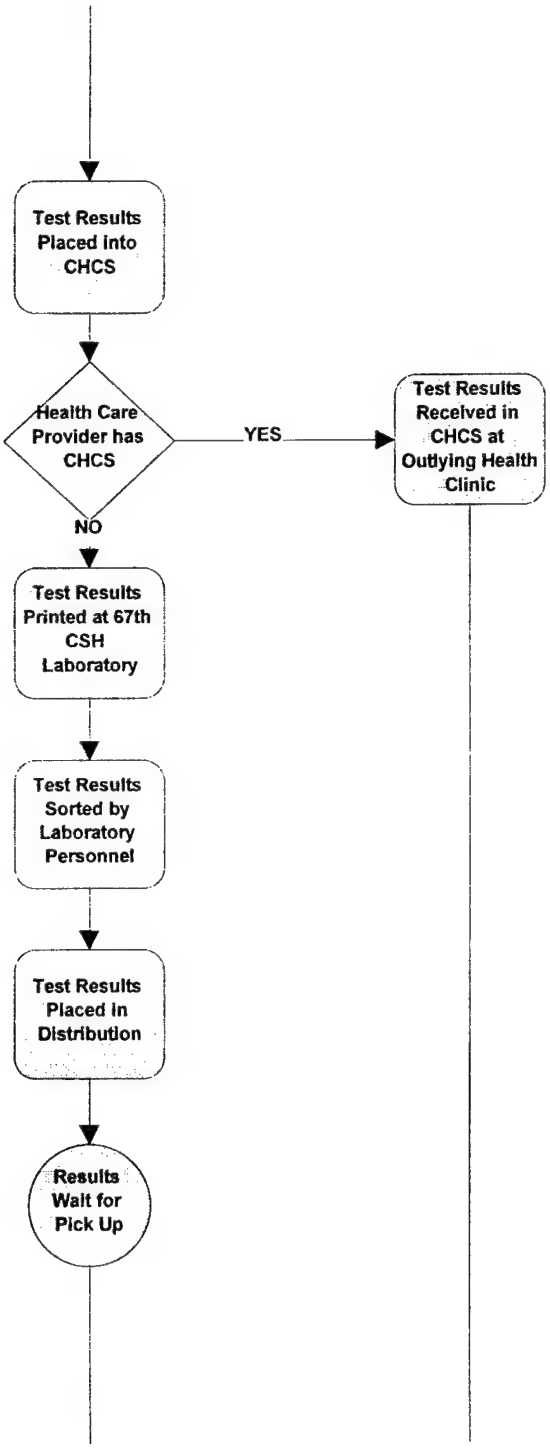


APPENDIX 8 Continued

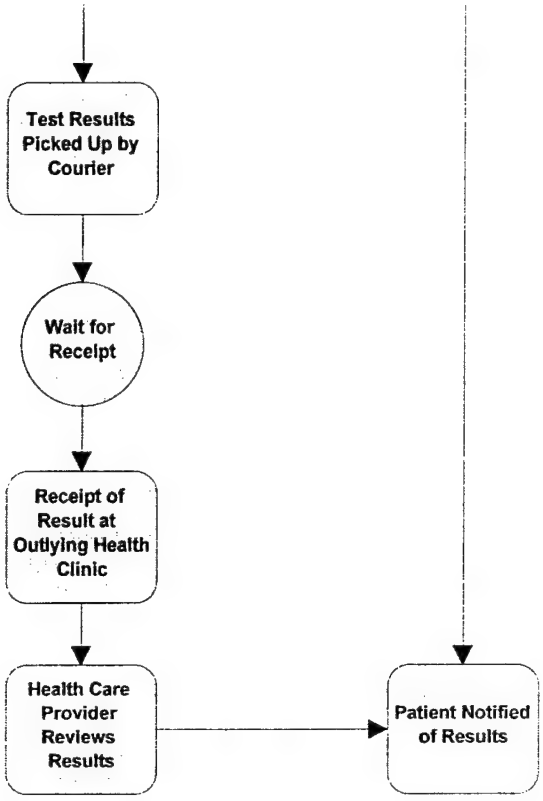


APPENDIX 8 Continued

APPENDIX 8 Continued

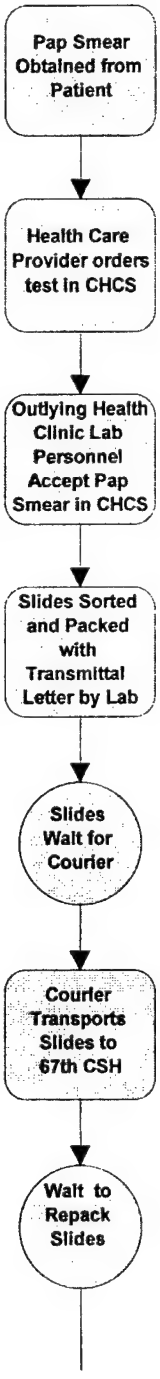


APPENDIX 8 Continued

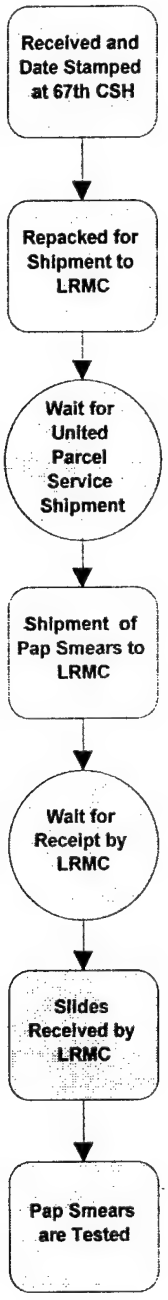


APPENDIX 9

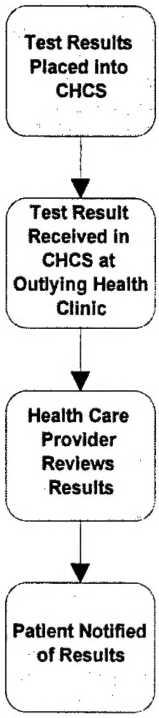
REFINED PAP SMEAR FLOWCHART



APPENDIX 9 Continued



APPENDIX 9 Continued



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